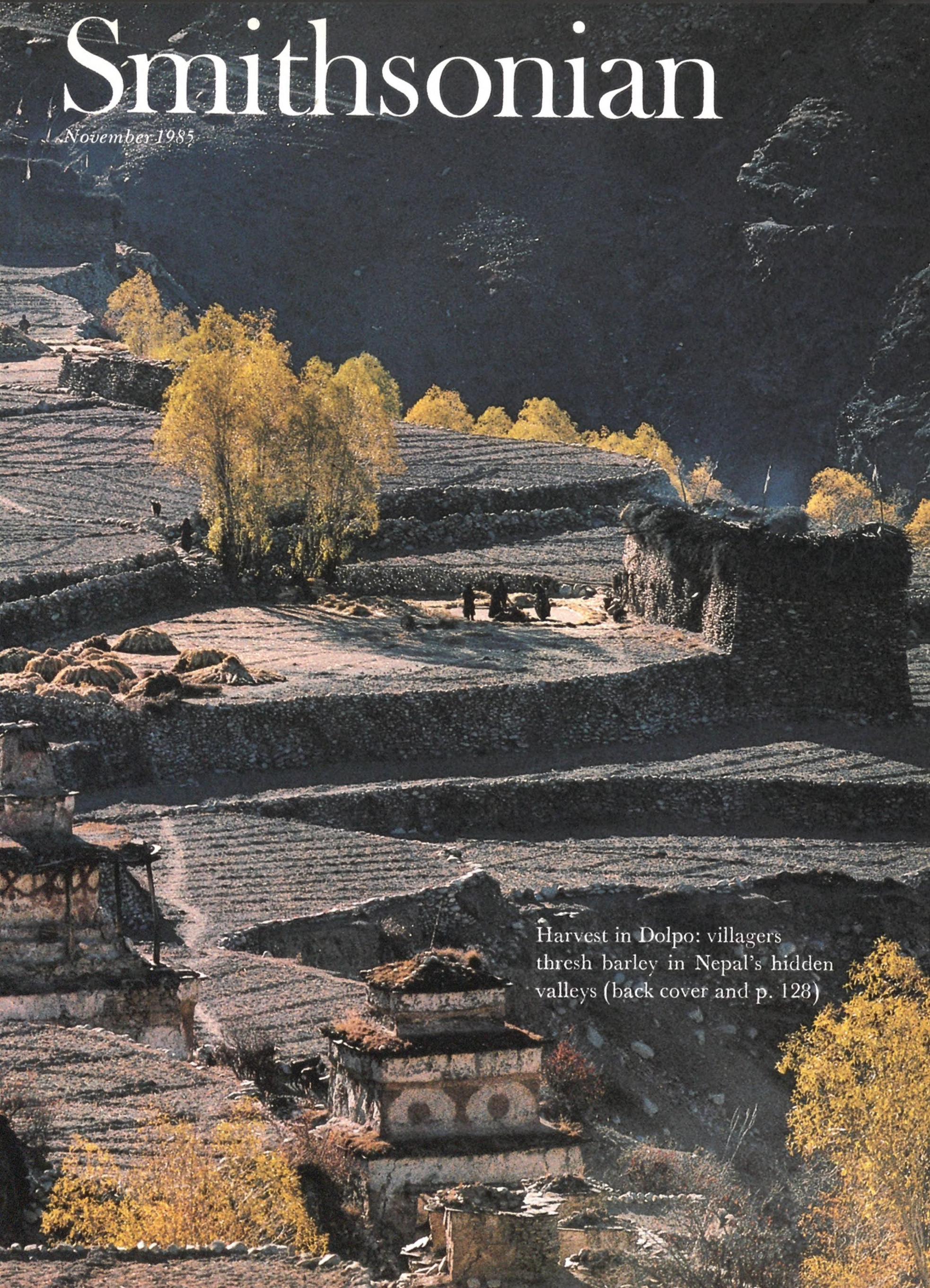
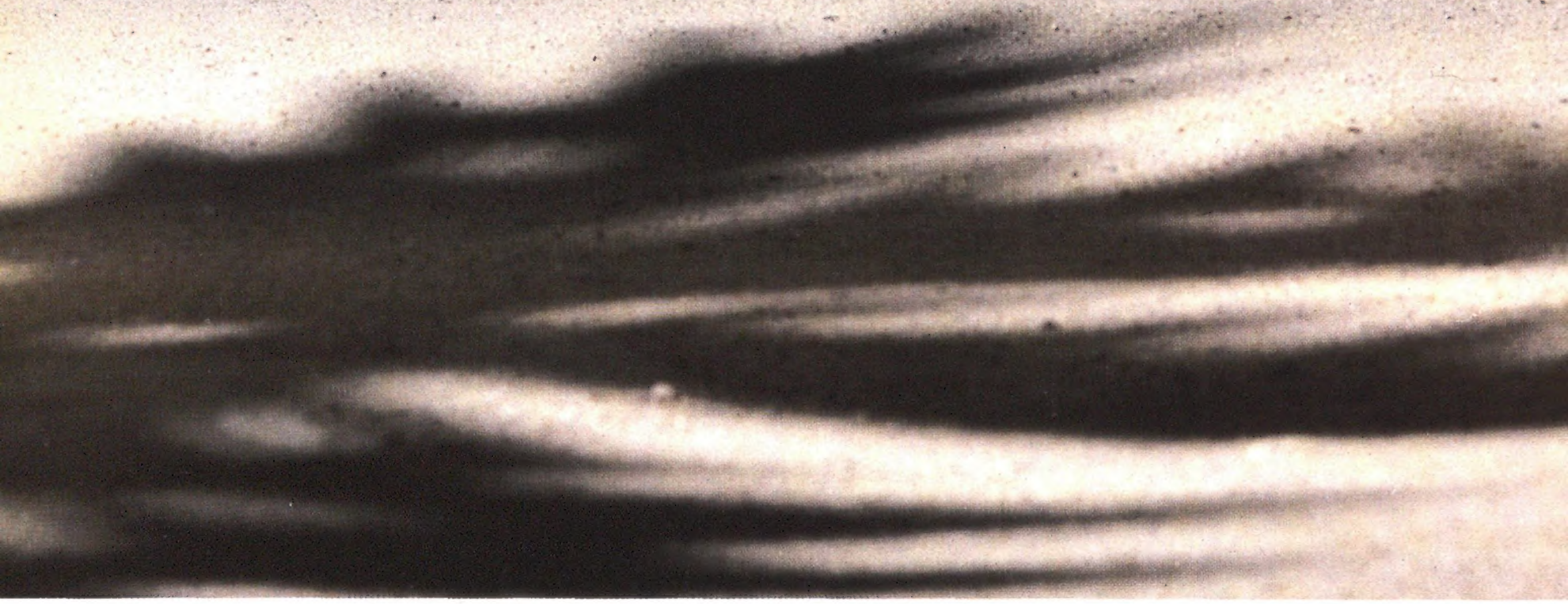
Smithsonian

November 1985



Harvest in Dolpo: villagers thresh barley in Nepal's hidden valleys (back cover and p. 128)



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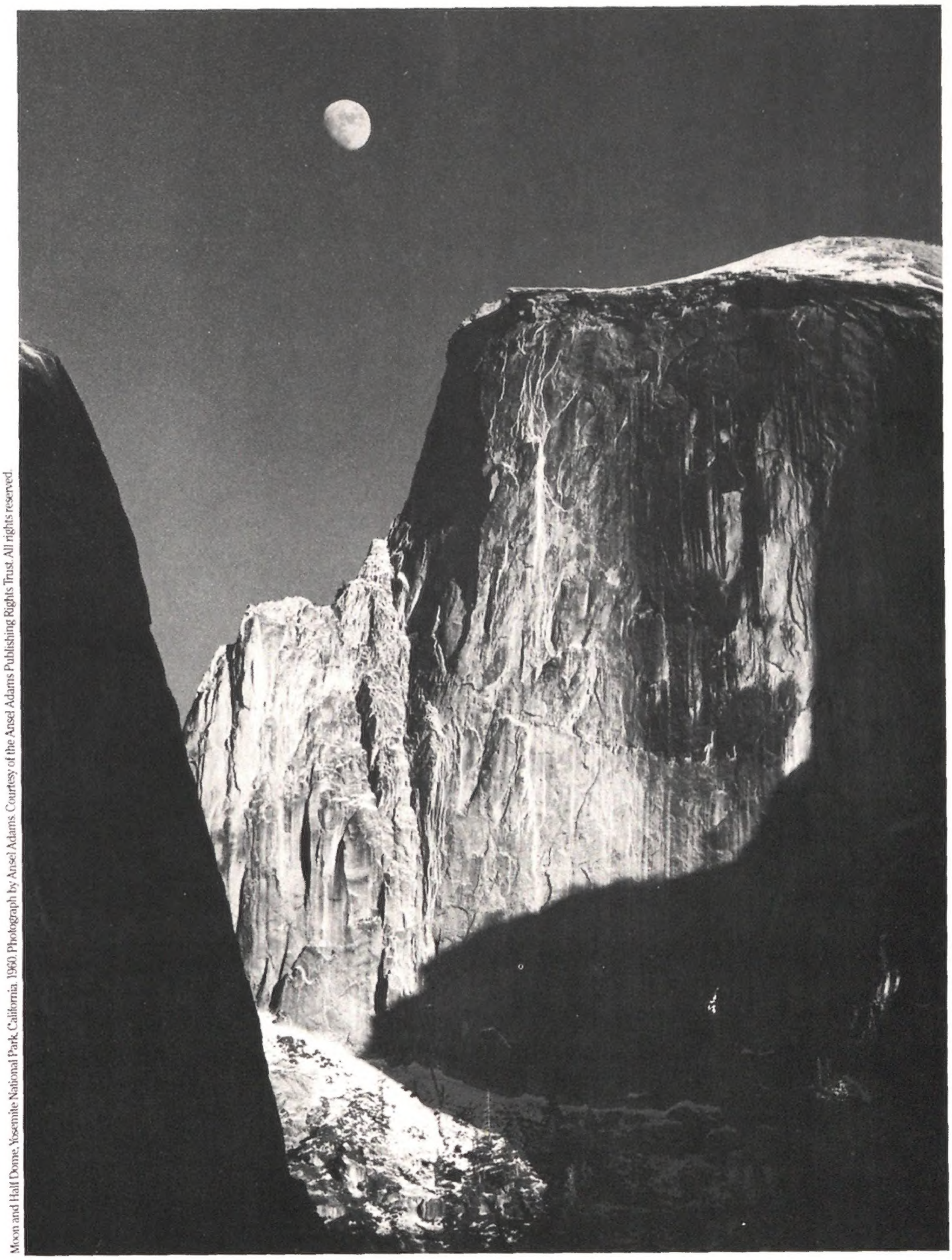

Moon and Half Dome, Yosemite National Park, California. 1960. Photograph by Ansel Adams. Courtesy of the Ansel Adams Publishing Rights Trust. All rights reserved.

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November 1985

Smithsonian

Volume 16, Number 8

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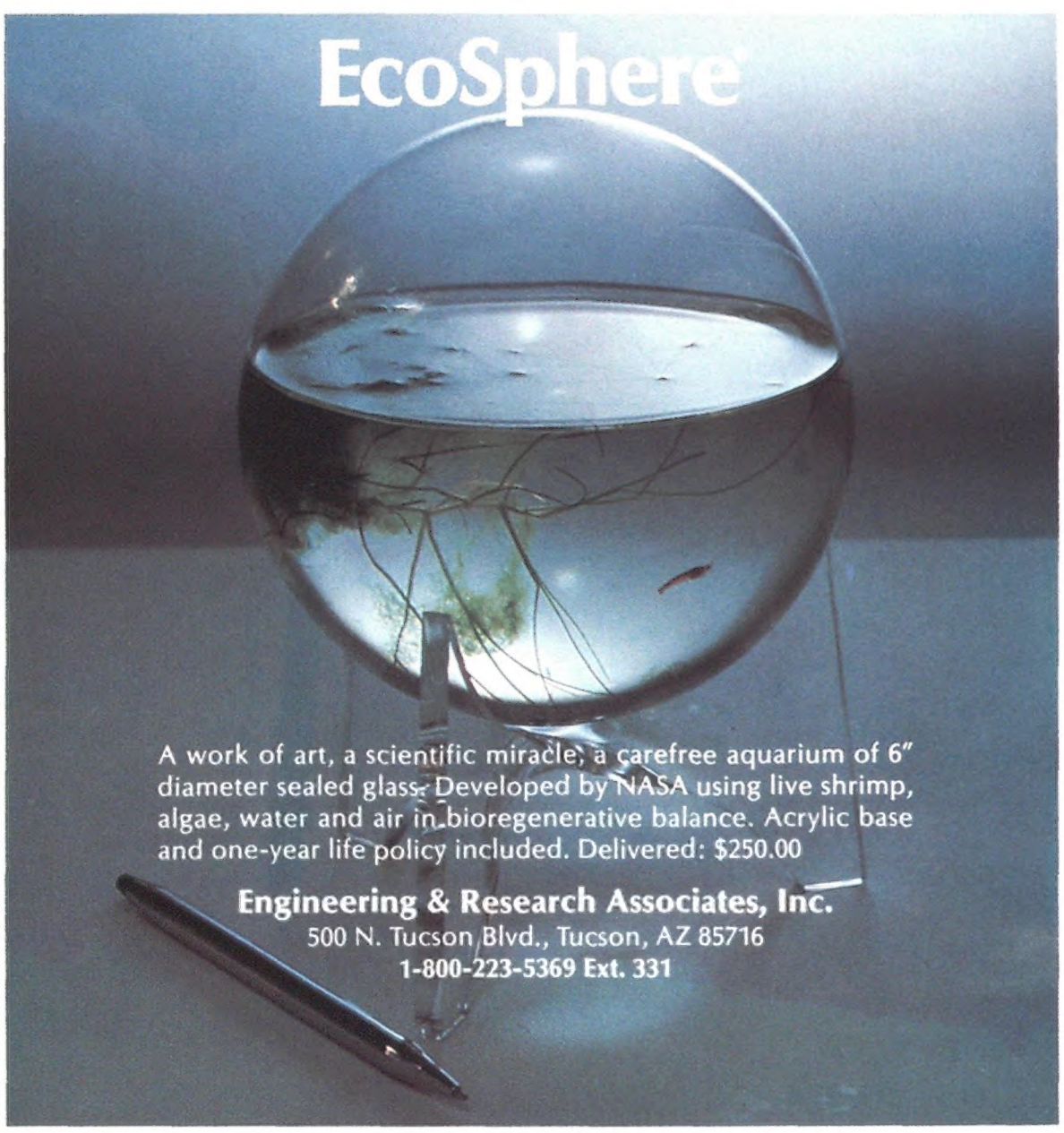
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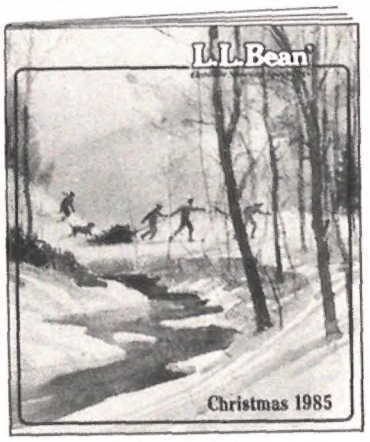

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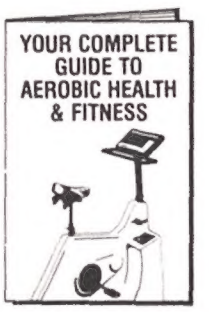

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Smithsonian horizons

Do sudden bursts of creativity simply reflect the times, or are they direct responses to an unexpected challenge?

Who could have listened to the recent Live Aid concert, reputedly heard by a greater world audience than any previous event of the kind, and not reflected—as figures like Bob Dylan reappeared in cameo roles—on the astonishing but transitory burst of creativity in folk and popular music during the Sixties?

Do we suppose that certain songs are only accidentally more memorable, having been composed under circumstances that led them almost effortlessly to epitomize the major convergences of their time? Isn't it more plausible to suppose that certain artists may be, for brief periods, challenged to greater heights by exceptional surroundings?

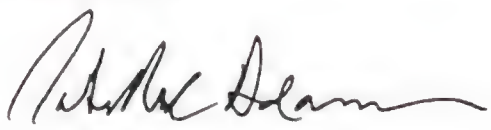
This brings to mind an entirely different example, which has been a burr under my skin since an exhibit at the National Museum of Natural History last winter. "Views of a Vanishing Frontier," organized by the Joslyn Art Museum in Omaha and sponsored by InterNorth Inc., presented watercolors of Karl Bodmer, a Swiss illustrator employed by Prince Maximilian of Wied-Neuwied to accompany him on a scientific expedition along the upper Missouri River in 1833-34. Having long had an interest in the American fur trade as an anthropological problem, the subject matter was familiar to me. I was familiar also with the roughly contemporary, much better-known work of George Catlin and Alfred Jacob Miller. What was unexpected, what was in fact a breathtaking discovery, was the understated quality and penetration of Bodmer's perception. His landscapes capture an empty and impersonal vastness for which nothing in his European background could have prepared him. His Indians—Sioux, Blackfoot, Mandan and others—somehow reach across time and enter our own lives as recognizable, admirable individuals.

The world Bodmer encountered had already been transformed by the arrival of the horse and the gun, spreading far ahead of the frontier through raid and trade. Smallpox and other white-man's diseases had already made devastating inroads. White traders, to meet the demand for beaver, were spurring new dependencies and intertribal rivalries. But the actual demise of that world still lay over the horizon. Hence the reasonably intact dignity, beauty and complexity of a whole way of life, now lost, is there for us to discover in Bodmer's work.

Calvin Tomkins, writing in *The New Yorker* about a portion of this exhibition at the Metropolitan Museum, shares my sense of discovery that many of the watercolors "stand up as first-rate works of art." How do we understand Bodmer's accomplishment, he asks, when we take into account his never having approached this level, either in his earlier career or upon his subsequent return to Europe? What prepared him to break away from the formal conventions of European landscape painting, to capture for us a priceless record under conditions of harshness and even privation?

Tomkins asks: "What are we to make of this story? A mediocre artist (artisan, really) is presented with an immense challenge and for a brief period produces great art, or something close to great art: then he subsides into mediocrity for the remainder of his life, presumably unaware of what he achieved at his finest moment. Was he simply unwilling to keep on paying the enormous price for work of that quality?"

Our sparse records permit no definite answer to these questions. We do not know what, if anything, Bodmer understood of the passing of the frontier that he was privileged to witness. Yet I can only echo Tomkins' judgment from the work itself: "He cut so close to the truth of appearances that I think he broke through it into something more profound: the extreme stillness at the moment of great change." Is that also at the root of other bursts of creativity, haunting but temporary?



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Letters to the Editor

Mountain lions

Dear Sir: Your September article brought to mind a hike along a recreational trail near Eugene, Oregon, in the spring of 1984. We came on the tracks of a cougar and her kit, easily identifiable along the muddy trail. The city of Eugene was visible at times as we hiked. Could it have been uncontrolled cat curiosity, or a lesson the young one needed to learn?

Although we saw only tracks, it proves the beautiful animal is still around.
Harold M. Dunn
Springfield, Oregon

Dear Sir: The photograph on pages 68-69, showing a lion drinking amidst the spectacular landscape of sandstone cliffs and blue sky is not southeastern Utah, but the mouth of Zion Canyon in southwestern Utah. I lived in that very landscape for five years as District Ranger at Zion National Park. It is definitely lion country, but seeing a lion in the wild was an infrequent occurrence. My wife and I explored the back country, side canyons, mesa tops, always in the hope that someday we would come face to face with the elusive cat. In spite of many close calls such as fresh signs and tracks, literally in our backyard, we never realized our goal.

One of the more interesting lion encounters involved Allison Graham, a 23-year-old seasonal ranger. In June 1980 at La Verkin Creek, a remote section of Zion's back country, she was alone, sitting on a slab of rock facing the creek, bright moonlight shimmering on the water's surface. It was after midnight when something caused her to turn her head and look over her shoulder. She was staring into the eyes of a mountain lion, standing

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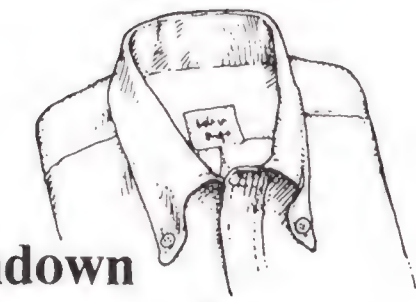

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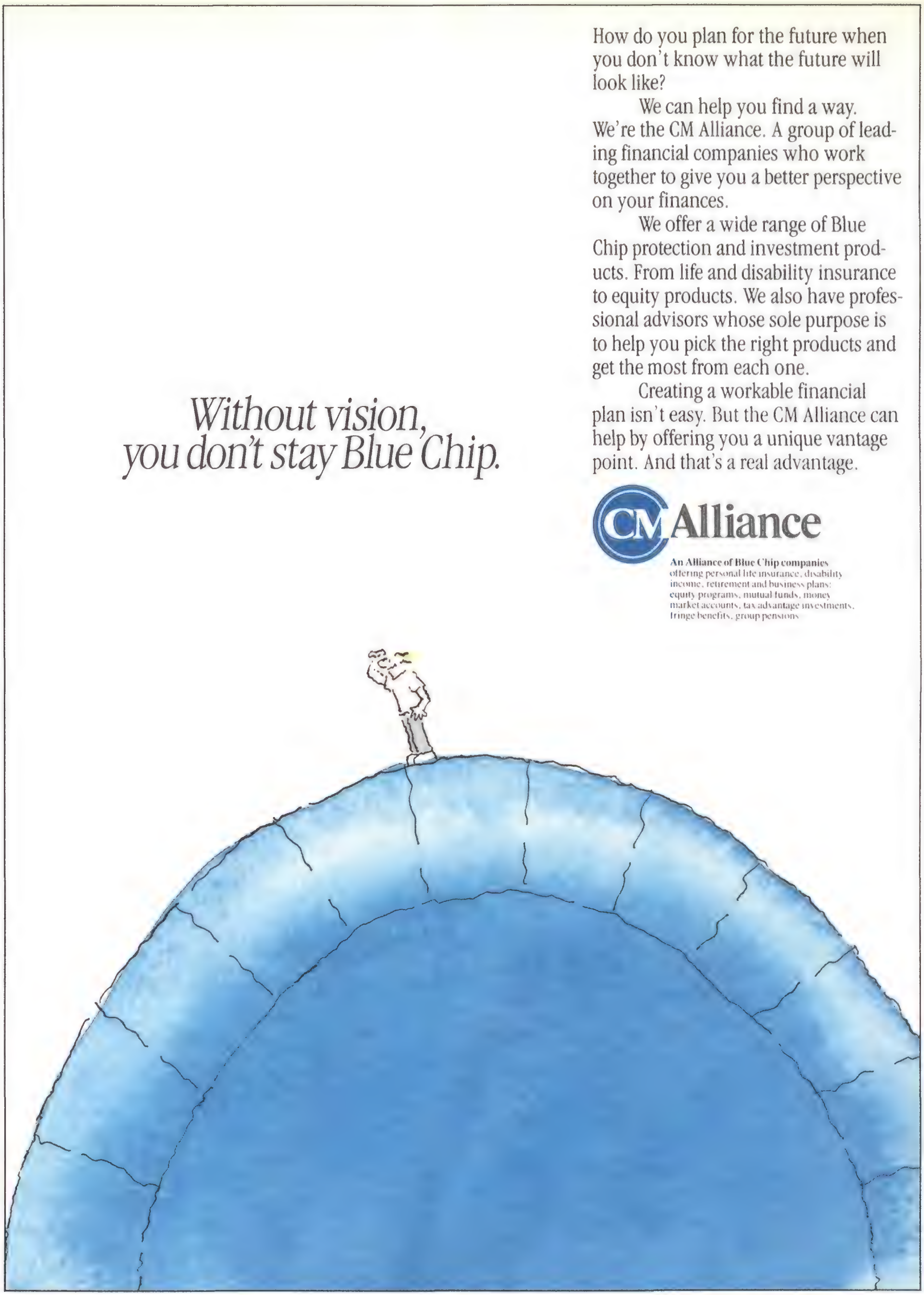

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on the same rock slab, just two or three feet from her. The curious lion, as startled as she, let out a hiss, stared at her for about five seconds, then turned abruptly, the tip of its tail brushing her clothing, and bounded to the top of the bank about 20 feet away. It continued to watch Allison for several minutes before disappearing into the darkness.
Anthony J. Bonanno
Asheville, North Carolina

Tower cranes

Dear Sir: In April, while attending a convention in Seattle, I was walking down the street early Saturday morning when a crane constructing a new high-rise fell 25 stories and landed about 200 feet from me. It scared me, but good! The operator rode it down and suffered only minor injuries. The paper later said some $1 million damage was done.
Allan G. Skinner
Anchorage, Alaska

Camille Claudel

Dear Sir: Camille Claudel is a symbol of who-knows-how-many other women artists whose lives have been negatively affected by the prevailing mores of patriarchy and who have in some cases vanished totally. Perhaps Rodin *did* pass off some of her best works as his own—we'll never know. We can only take an objective look at their lives, as did Mr. Wernick, and be aware of the possibilities.
Rosemary C. Anderson
Hadley, Massachusetts

Kansas State Fair

Dear Sir: Mr. Perrin should know that the film in which he credits Jeanne Crain, charming as she is, with immortalizing state fairs was a remake of the original film that did, indeed, immortalize state fairs in general and the State of Iowa in particular. It starred Will Rogers, Janet Gaynor and Lew Ayres.
Doris E. Troiani
Menlo Park, California

Dear Sir: My most exciting recollection of the Pennsylvania State Fair in the 1930s is the vision of the magnificent draft horses—Percheron, Clydesdale, Belgian and others—all far taller than I in my full growth. These superb creatures,

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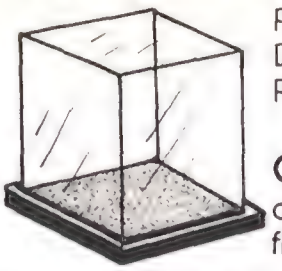

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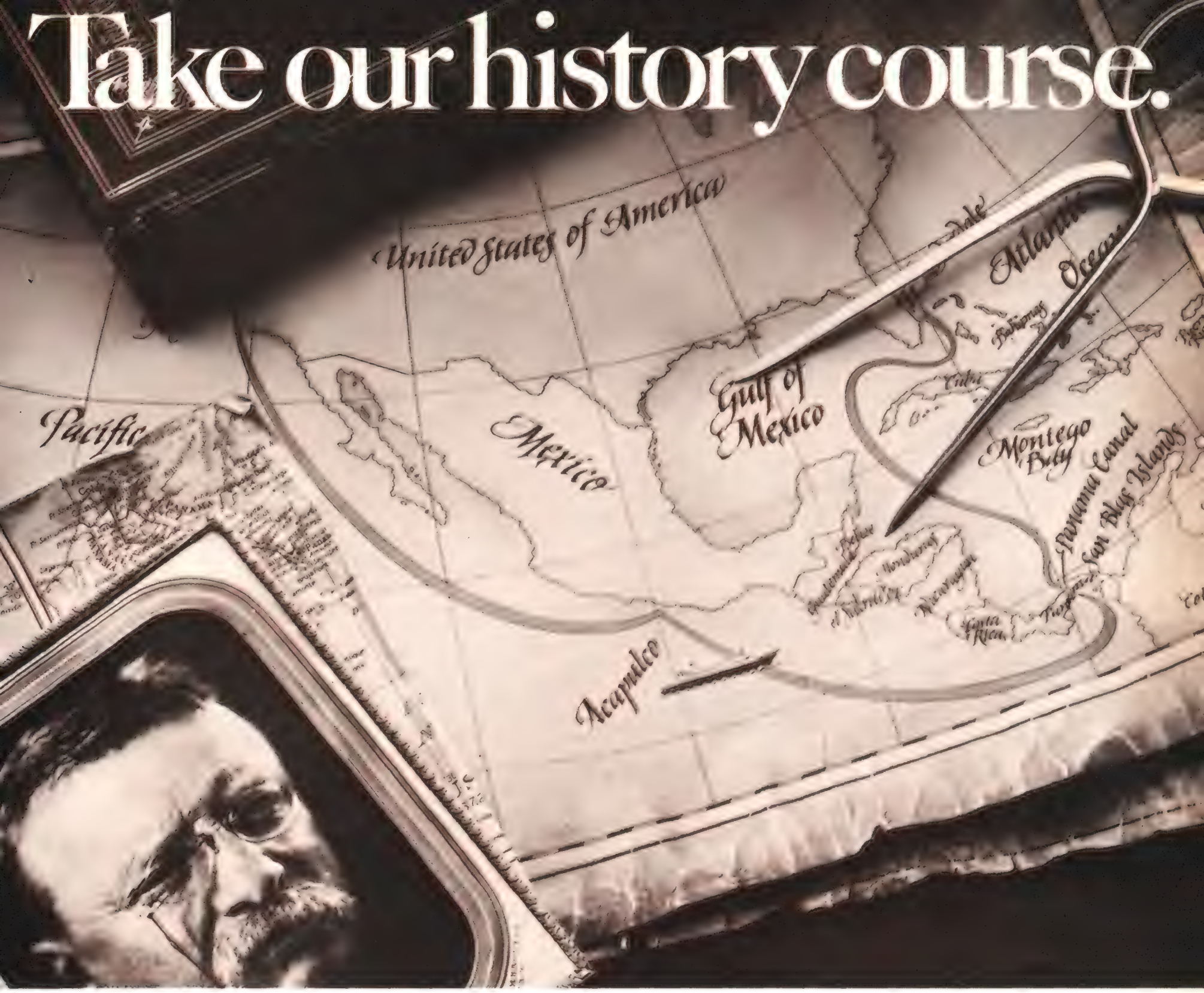

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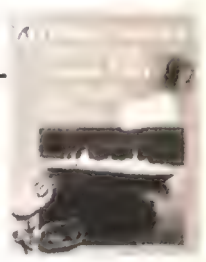

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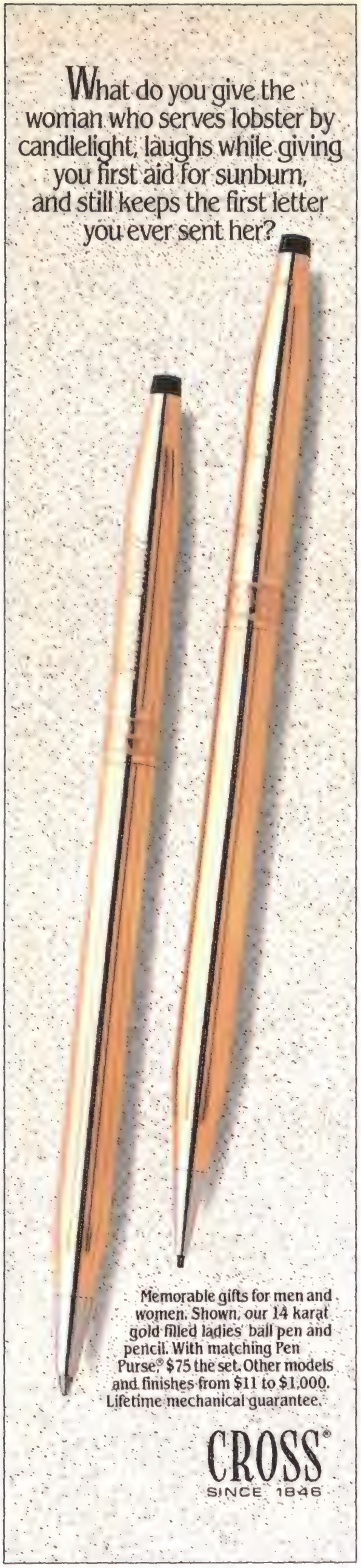
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groomed to perfection, were to be judged after the sheep and before the cattle.

I understand that they are not exhibited any longer, machinery having replaced them. I am so glad that the Belgians have been retained in Kansas, even if only for a draft-horse pulling contest.
Virginia Barton Wallace
Kennett Square, Pennsylvania

Dear Sir: We have outlawed bearbaiting, bullfighting, and dog- and cockfighting in this country. But we still beat horses around the racetrack, ignore the sometimes-fatal injuries in rodeos, and force animals to pull more than their weight in state fairs for one reason: to show off. Look at the picture on pages 104-05. Should such activity be publicized just so those who enjoy seeing animals in duress and pain can win prizes?
Lochie Jo Allen
Roxbury, New York

Niagara Falls

Dear Sir: I note no mention of the artist John Vanderlyn. The painter of presidents Washington, Madison, Monroe, Jackson, Van Buren and Taylor, of the famous *Landing of Columbus* in the Rotunda of the Capitol and the great *Panorama of the Palace and Gardens of Versailles* recently installed at the Metropolitan Museum of Art [SMITHSONIAN, August 1985] ranks with the major painters of our early Republic.

He is credited as the first trained American artist to paint Niagara Falls. From his 1801 visit there we have two companion engravings of Niagara, and seven paintings of the cataract from that and subsequent visits. Two sensational five-by-seven-foot canvases in the latter group, which turned up only recently, are on public view for the first time in the Corcoran show. Vanderlyn, who visited the Falls half a century earlier than Church, shares with that artist the claim of being THE painter of Niagara.
John Davis Hatch
Lenox, Massachusetts

The French at table

Dear Sir: Rudolph Chelminski's story evoked wonderful memories of the most educational year of my college career, 14 years ago. I arrived in France with intentions of avoiding wine (which I had never had) and cheese (which I had never liked) and not eating much bread (which I liked only too well).

Fortunately curiosity and common sense prevailed. I learned to put a torn *tranche de pain* on the tablecloth with no concern for crumbs; to rest one hand, at the wrist, on the table instead of my lap (an ancient custom—a knife could not be concealed in its owner's hand if both hands were visible) and to relish most French cheeses and wines.

Opening the mind necessitates, in part, opening the mouth more often to put new and different foods into it and less often to let old and worn words spill out.
Barbara Pilvin
Philadelphia

Dear Sir: Rudolph Chelminski states that Catherine de Médicis "crossed the Alps to marry the man who became Henry II." Catherine actually arrived by sea, leaving Spezia with a fleet of 27 ships and landing first in Nice and then in Marseilles, bypassing the Alps altogether.
Francis J. Geck
Boulder, Colorado
Mr. Geck is correct. Ed.

Mall

Dear Sir: One aspect of Edwards Park's September column was frightening indeed. Heaven help the human race if people become heroes for "walking a total of two and a quarter blistering miles" in order to see points of interest. Our grandchildren must have an automobile to travel three blocks to the nearest Pac-Man Parlor; the Yuppies will jog miles per day but will not walk four blocks to the nearest newsstand. But I had hoped the majority of rational adults are still capable of walking two and a quarter miles without receiving medals. If we have indeed deteriorated to such a low level, we must hope that some more deserving animal species will at least preserve some skeletons of Homo sapiens in museums of the future.
Donald J. Pletsch
Gainesville, Florida

Irrepressible journal

Dear Sir: As the author of the first-cited article in William Weber Johnson's essay, I feel that I have reached some sort of pinnacle of my career—being recognized

One day a man counting his blessings counted how lucky he was to be in this country.

So he got out the Constitution to see what made it tick. Being an artist, he was inspired to inscribe and illustrate it. A publisher saw it and said we must publish this book. James Michener saw it and said I must write a foreword to this book. Lands' End saw it and said we must tell every American to buy this book. Here is Mr. Michener's foreword.

In the closing years of the eighteenth century the American colonies in North America won two stunning victories. In 1783 on the battlefield at Yorktown they sealed a military victory which ensured their freedom, and during the summer of 1787 in the debating halls of Philadelphia they won a political struggle which enabled them to survive triumphantly until today.

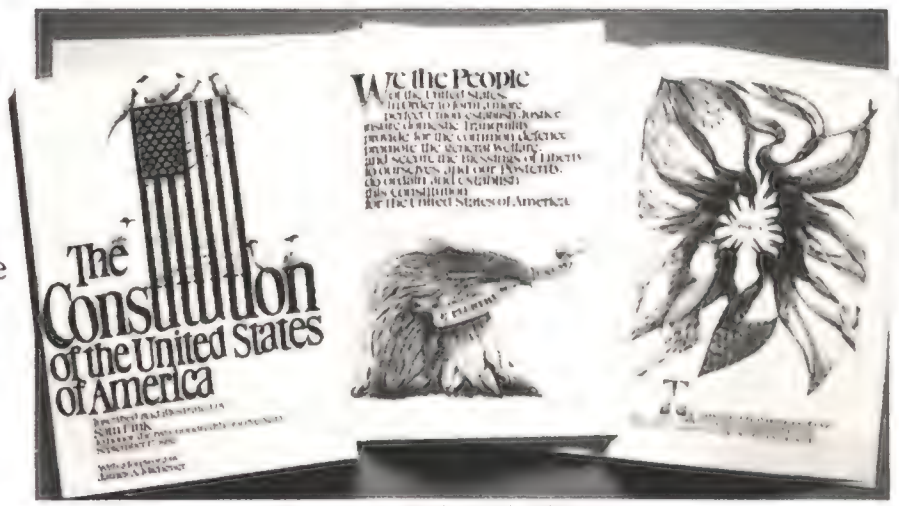
The writing of the Constitution of the United States is an act of such genius that philosophers still wonder at its accomplishment and envy its results. Fifty-five typical American citizens met and argued for 127 days during a ferociously hot Philadelphia summer and produced one of the magisterial documents of world history.

Almost without being aware of their great achievement, they fashioned a nearly perfect instrument of government, and I have studied it for nearly seventy years with growing admiration for its utility and astonishment at its capacity to change with a changing world. It is a testament to what a collection of typical free men can achieve.

I think this is the salient fact about our Constitution. All other nations which were in existence in 1787 have had to alter their form of government in the intervening years. France, Russia and China have undergone momentous revolutions. Stable nations like Sweden and Switzerland have had to change their forms radically. Even Great Britain, most stalwart of nations, has limited sharply the power of its monarch and its House of Lords.

Only the United States, adhering to the precepts of its Constitution, has continued with its same form of government. We are not of the younger nations of the world: we are the oldest when it comes to having found the government which suits its best.

It is instructive to remember the fifty-five men who framed the document. Elder statesmen like George Washington and Benjamin Franklin contributed little to the debate but greatly to the stability and inspiration of the convention. Thomas Jefferson, perhaps the most brilliant American of those days, missed the meetings entirely; he was on diplomatic duty in France.



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The hard central work of determining the form of government seems to have been done by a handful of truly great men: James Madison and George Mason of Virginia, Roger Sherman of Connecticut, James Wilson and Gouveneur Morris of Pennsylvania. Alexander Hamilton of New York did not speak much but did exert considerable influence.

The fifty-five contained a college president, a banker, a merchant, a great teacher of law, a judge, a mayor, a clergyman, a state governor and a surgeon. One-sixth of the members were foreign born. Two were graduates of Oxford University, one of St. Andrews in Scotland. But the group also contained some real nonentities, including a military man who had been court-martialed for cowardice during the Revolution, some who contributed nothing to the debate, and some who were not quite able to follow what was being debated.

What this mix of men did was create a miracle in which every American should take pride. Their decision to divide the power of the government into three parts—Legislative, Executive, Judicial—was a master stroke, as was the clever way in which they protected the interest of small states by giving each state two senators, regardless of population, and the interests of large states by apportioning the House of Representatives according to population.

But I think they should be praised mostly because they attended to those profound principles by which free men have through the centuries endeavored to govern themselves. The accumulated wisdom of mankind speaks in this Constitution.

In this book the document on which our liberties as citizens and our continued existence as a nation depend is presented in a manner that invites the reader to wonder at its inspiration, its clarity and its permanence. The foundation document of our nation is thus made accessible to all.

James A. Michener
Sitka, Alaska

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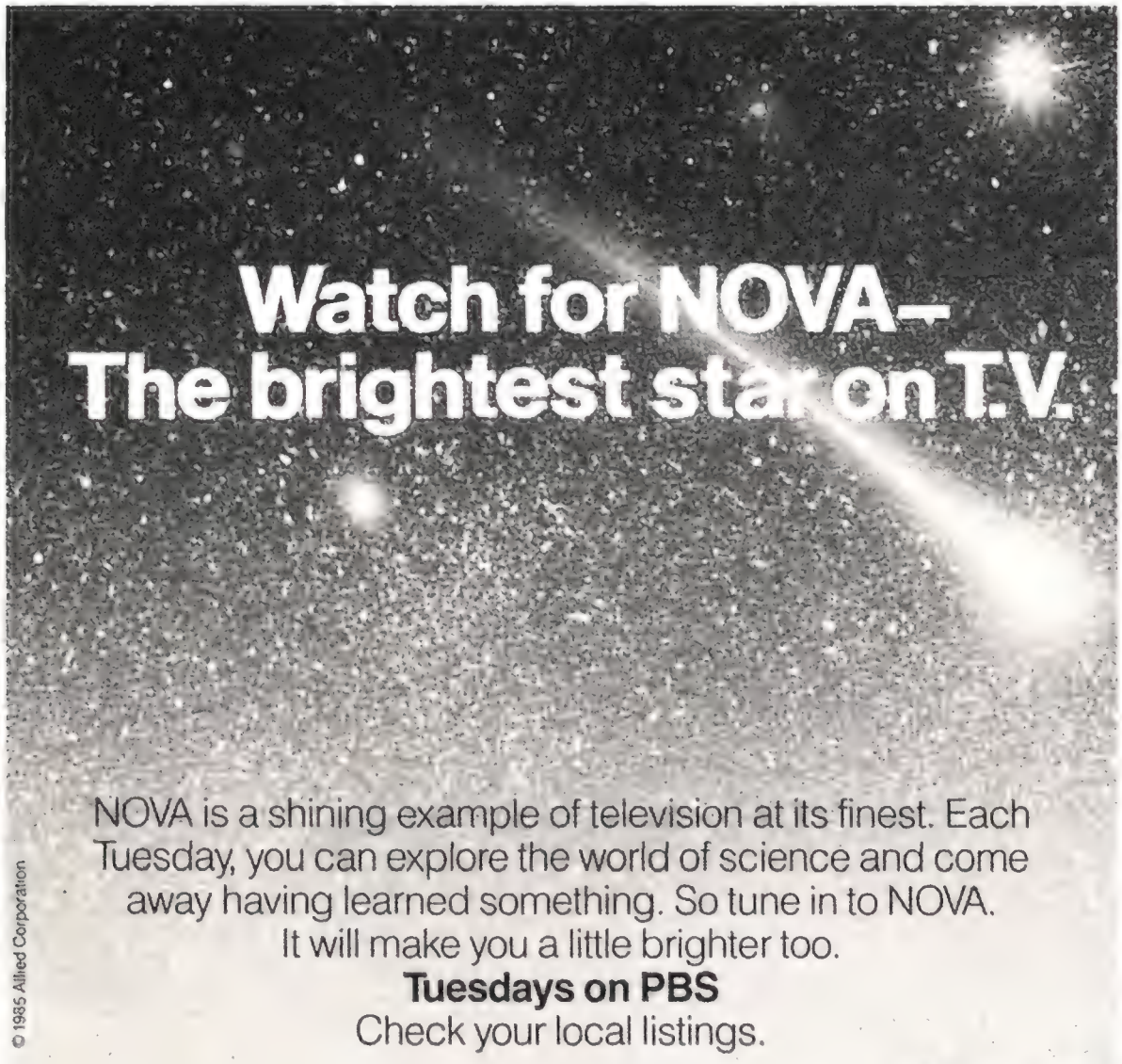
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by a publication of the Smithsonian Institution! As an additional comment on the observation that the scientific world often is the best parody of itself, I have included the *Journal of Irreproducible Results* reference in its proper chronological place in my academic bibliography. Never once has a chairman, a faculty review, a promotion committee or anyone else even noted that it was there.

Sidney L. Saltzstein, M.D.
San Diego

Dear Sir: Some years ago, doing genealogical research at the Public Archives of Nova Scotia, I scanned thousands of names in faded ledgers and exhausting microfilm, coming across wonderful old monikers: Hercules, Iphigenia, Theobald, etc. This led to my inventing unlikely but somehow plausible names, viz.: Timor S. Beestie, Lil Epushan, Percy Flodge, Emir Pittance, Lord Knowes, Na Tu Bryte, U Chi Kuchi, Mustapha Baath.

The disease spread insidiously. An Irish friend said if I ever needed legal counsel I should call up the firm of Shorley, Goodness and Murphy.

Patrick O'Sheel
Chevy Chase, Maryland

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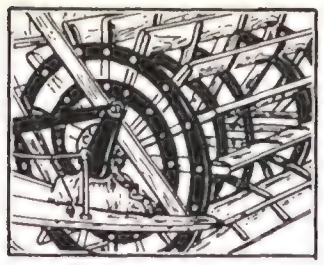

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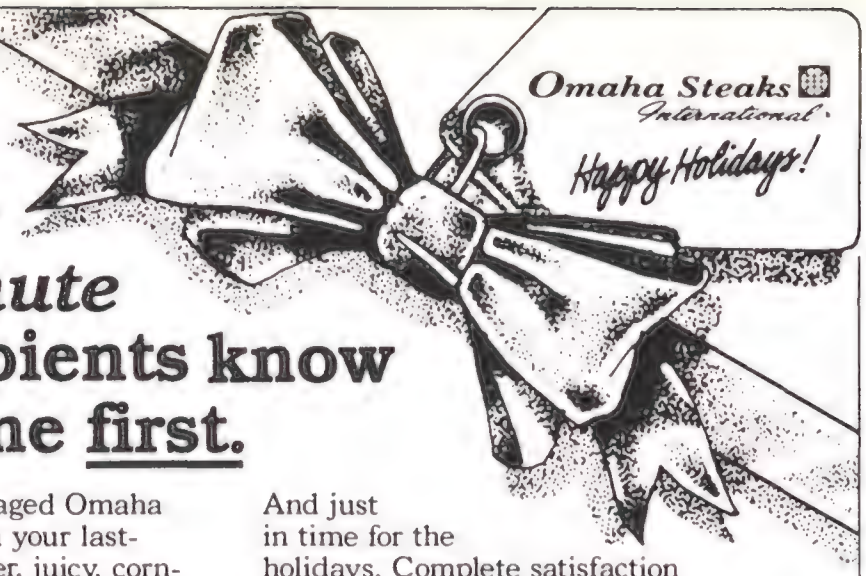

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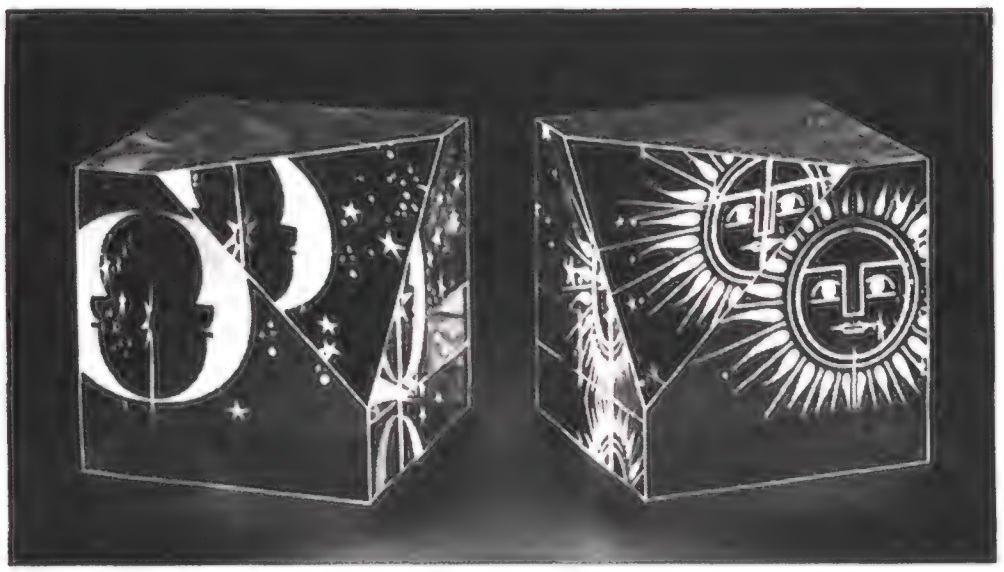

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Ever since I visited a display of abstract paintings, sculptures and wall hangings at the Hirshhorn Museum and Sculpture Garden some years ago, and discovered a young couple intently studying a small metal device for measuring humidity, I have wanted to learn more about modern art exhibits. How is a show conceived? How is it organized? How is it hung on walls or ceilings or placed on floors?

I thought the answers might come in a trickle during a luncheon with some friends at the Hirshhorn. Instead, they came in a springtime flood that could only be channeled by so many visits to the Hirshhorn that I became recognized as a sort of Quasimodo, shuffling through the gallery's inner sanctums.

In the business of writing, it's a truism (often, unfortunately, overlooked) that before you write one word you must have an idea. In setting up an art exhibit the same holds. "When you know you're onto an idea, you begin thinking about it as an exhibition," said Howard Fox, curator of the show "A New Romanticism: Sixteen Artists from Italy," which opened at the Hirshhorn last month and will continue through January 5. Fox has now left us, lured away by the delights of California. Before leaving, however, he and my old friend Ted Lawson, chief of the Hirshhorn's Department of Education, joined me for a bite of cannelloni, a sip of vino and a ton of conversation.

"When I was doing our tenth anniversary show, last year, I got interested in some of the Italian works that we exhibited," Fox continued. "I got a feeling about them when I was making the selection." He did some research and found, sure enough, that there was a certain

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frame of mind in today's Italian art. Thus the exhibit was conceived.

Howard Fox told me that curators of contemporary art move quite fast when they sense an exciting trend or artist. "A more arcane subject might take two years to put together as a show," he pointed out, "but when you're planning a contemporary art exhibit, you minimize the lead time. You must be decisive."

How, I wondered, did curators keep up with so many artists, so many trends and fashions? "Curators are on every conceivable mailing list, from galleries and agents and museums all over the world," Fox replied. "The mail floods into their offices at the Hirshhorn, and they go over it and hold onto things that interest them. The rest they put into a pile in the library where everyone else has a chance to go through it. When someone is chasing down a show idea, every source is useful. There is no such thing as junk mail until you're through with it. It's all part of the process of maturing an idea and composing an important exhibit."

The primary process, of course, is contacting specific artists and visiting their studios if it seems worthwhile. This may lead to a real discovery, as it did recently at the Hirshhorn. Fox noticed some photographs of sculpture in the catalog of a show featuring Cornell alumni. He got interested enough to chase down the sculptor, John Van Alstine, found he was living in Wyoming and telephoned him.

Fox introduced himself and said he was sort of interested in Van Alstine's work, and would he send off some photographs.

"Come *on*!" said Van Alstine. "Cut it out! Who *is* this, anyway?"

Fox repeated his name.

"Who is it *really*?" asked Van Alstine.

"Look, it doesn't matter," said Fox. "Just put some photos in an envelope and shoot them off to the Hirshhorn."

There was a pause, and then Van Alstine said, "You're really you, aren't you?"

Now the Hirshhorn has two Van Alstine sculptures.

"One way or another the information comes in," Fox told me. "It's the curator's job to put it all together. Then the idea is sent to the Museum Director."

Ted Lawson provided me with a Request for Loan form, which indicates the checks and balances involved when any museum (not just the Hirshhorn) borrows or lends paintings or sculptures

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for an exhibit. The request is signed off by one echelon after another: the Painting and Sculpture Department, which is concerned with insurance costs; the Museum Director—conditionally; the Registrar, who is concerned with whether this loan gets in the way of future plans or commitments and with verifying catalog data; the Conservation Department, with recommendations as to how best to preserve and maintain the object(s). The Director again signs a final approval or denial, and the answer to the request is formally written. The red tape makes it abundantly clear that you don't just go around setting up a show containing millions of dollars worth of art without a lot of care and planning.

The Hirshhorn's Loan Agreement, filled out when it borrows an object for a show like "The New Romanticism," includes exact specifics—the dimensions of a frame, the approximate weight of a sculpture—and such questions as "May we substitute Plexiglas for glass?" Plexiglas, the Hirshhorn people feel, is a lot better because it won't break. You can't use it over a pastel, however, because it's so enormously charged with static electricity that it might pull the particles of pastel color right out of the picture.

Chemistry and physics, however, don't often cut much ice with artists. With incredible impracticality, some have been known to have conceptions about the display of their work which not only endanger it, but everyone around it.

There have been cases where an artist wanted fireworks exploding around his opus, where a sculptor wanted his piece balanced precariously instead of being secured to the floor or at least to a broad Lucite platform that wouldn't capsize. Contemporary sculptors with mobiles may sometimes be more concerned with how they look than with how they work. A high-speed motor that played an important role in one recent sculpture caused some consternation in the museum. Eventually, someone had to bite the bullet and turn it off.

"Our outdoor sculpture requires periodic maintenance," said Ted Lawson as we walked through the Hirshhorn lobby. He pointed to Henry Moore's *King and Queen*, a piece which used to be out in the Sculpture Garden. "We've had to move that inside. One of the king's arms started to come apart and moisture was

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Hirshhorn sculpture conservator Lee Aks heats William King's bronze *Venus* in preparation for annual waxing.

getting inside, causing salts to leech out from the bronze and form a white encrustation on its surface. We had to keep it in the Registrar's workroom under a polyethylene blanket and dry it out. Then we decided to keep it inside."

Outside pieces are bathed regularly. In the Sculpture Garden, most of the pieces are bronze. "All of the bronzes with the exception of the highly polished ones get an annual coating of wax," says Dan Murray, an exhibits specialist who used to work as an assistant to sculpture conservator Lee Aks. The pieces are washed with mild detergent and stripped of old wax, then rewaxed with a compound that's a good deal more exotic than what you put on your floor.

Some of the bronzes are heated gently with a propane torch (above) so their pores will open and allow the wax to penetrate more deeply, enriching the patina and providing even greater protection. Pigment is sometimes added to the wax to match different patinas, Dan says.

I asked about Rodin's *Burghers of Calais,* which has a nice, rich green patina. "It just gets a clear wax," Dan said. "Highly polished bronzes get lacquer instead of wax. But you have to spray it on in a dust-free environment. So we've moved the polished bronzes inside. We treat these David Smith steel

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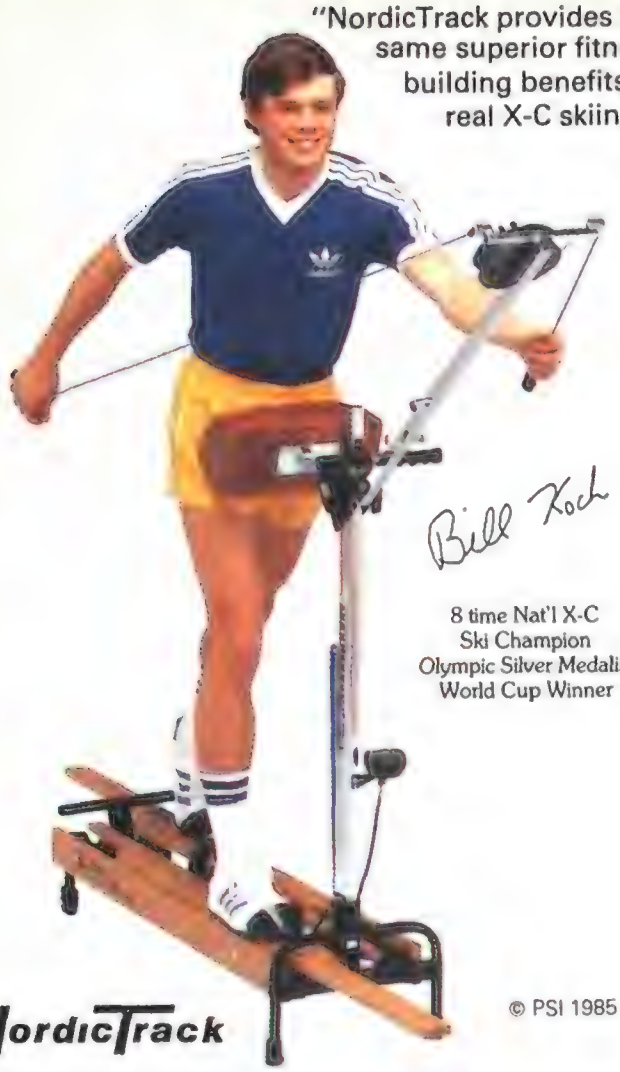

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sculptures" (we'd reached the west end of the garden) "with a linseed-oil compound. Stainless steel is simply washed with soap and water. Stone sculptures are given a very thin coat of crystalline wax. All the pieces are hosed down every couple of weeks."

Painted outdoor works must be periodically repainted. Dan noted that many artists use everyday paints so they can be renewed easily. "Calder was more particular, however," he said. "He sometimes used specially mixed colors, a little harder to renew. When we wanted to repaint George Rickey's *Three Red Lines*, that large kinetic sculpture on the plaza near the Mall steps, we couldn't find his original paint. We found something just like it and called him up, and he said that was fine."

Dan pointed out that the Hirshhorn is more preservation-minded than many other art museums. "Here we make a concerted effort to keep the sculpture pieces the way the artist left them," he told me.

"Lighting is a tricky business from the conservation point of view," Ted Lawson said when I pursued that Hirshhorn characteristic. Light is damaging to paper, and drawings should receive less illumination than paintings or sculpture. The rule at the Hirshhorn, according to conservator Clark Bedford, is no more than ten footcandles of illumination. The duration of exposure is also important. Drawings at the Hirshhorn can only be exhibited for up to three months a year.

As always, I have come away from art more bemused than when I approached it. I started out to learn more about the new Hirshhorn show, and instead have been snagged and enthralled by the museum's inner workings and by some philosophical ponderings about where the artist's pure intention stops and the museum's equally pure responsibility begins.

Aside from that, I'm not sure how much good it will do me to know that Anthony Caro's *Monsoon Drift*, on the plaza near the fountain, is made of steel that has been coated with a special linseed-oil compound. Or that the Cor-Ten steel of Charles Ginnever's untitled work, nearby, develops a patina which preserves the surface—but also weeps a little onto the pavement around it. I can only hope I have been usefully broadened.

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Phenomena, comment and notes

An aging satellite pulls off a coup as it survives an encounter with the turbulent tail of a minor comet

At 3 A.M. on a Wednesday in early September, I climbed a hill in Virginia, binoculars and star charts in hand, trying to get above the ground fog. Horses watched with mild curiosity as I scanned the sky from Auriga down a line between Orion and Gemini, looking for a small comet that was to occult (pass in front of) a star. I looked in vain. The moon, near last quarter, was bright; the sky was hazy from a heat wave; and the fog kept swirling around. The occultation was to have occurred at 3:35; by 4, never having found the comet, I went back to bed.

Friday of the next week I went to an amateur observatory, one boasting a telescope with a 14-inch objective, to see the same comet. There would be no moon, and this instrument would make it possible to see objects 1,700 times fainter than those visible to the unaided eye. We whiled away the night looking at Jupiter and its Galilean moons and the great Andromeda galaxy. Finally, again about 3 A.M., the comet was high enough in the eastern sky and we looked at it. I think I saw a fuzzy patch, like a star out of focus, but only by using averted vision. When I tried to look directly at the comet, I could not see it. Within an hour the almost-there fuzzy patch had moved, so we were certain we had the comet. But exciting it was not. (We also looked for Halley's, just two degrees away in the sky that night, but saw nothing at all. Halley's was still crossing the asteroid belt then, and too dim for us to see.)

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Between those two frustrating nights, I had spent a lot of time at the Goddard Space Flight Center, listening in as the mission controllers steered a seven-year-old, ailing satellite right through the tail of that dim comet, Giacobini-Zinner, sending the spacecraft 44 million miles away from Earth with brainpower instead of mighty engines. The spacecraft, a half-ton stubby cylinder just over five feet high and almost six feet across, was traveling 13 miles a second (46,800 miles an hour) relative to the comet when it plunged into the tail, and some scientists feared that dust grains and larger particles would do irreparable damage: anything larger than a grain of sand, much less a golf ball, would have destroyed it. (The comet itself was moving at 144,000 mph at encounter: duck hunters will appreciate the maneuvering skills involved.)

The satellite, the International Cometary Explorer (ICE), had seen better days. Its condition reminded me of some of the cars I've driven. Some of the experimental apparatus had stopped functioning. The batteries had gone dead in 1981, leaving it to operate solely on its solar cells. Normally this is no problem, but scientists feared that as the satellite entered the comet tail, the cells would be covered with dust or damaged and ICE would go dead.

Even in the bright sunlight of interplanetary space, the solar cells were producing about 20 percent more than ICE needed (the surplus was dumped into a bank of resistors). To improve the odds, controllers switched off the three least valuable experiments and the heaters for the hydrazine fuel. This last was a calculated risk. Controllers believed the fuel would turn to slush without the heaters, making the attitude-adjustment jets inoperative. Then, if a small particle should knock the spacecraft out of kilter, they would be unable to right it. But they reasoned that at a distance of 44 million miles, it would be four minutes before they knew what happened, and it would take another four minutes for the correcting command to get back to ICE. And at the time they believed ICE would be in the tail only five to seven minutes.

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Its fragile antennae recording unseen forces, satellite flies into comet tail.

Maryland. Most of the displays recorded changes in things like electronic density and magnetic-field strength, whose significance was not immediately apparent. But a line across the top showed the power output of the solar cells and everyone in the room—scientists and reporters alike—understood the meaning of that. If the line started to drop, ICE was probably going to fail.

The line never wavered: going in, during the 18 minutes ICE actually spent in the tail, or going out again. At a news conference two days later, Fred Scarf, a scientist with TRW, said his instruments showed an impact with a dust particle about once a second. At the relative speed ICE was moving, that meant one particle every 13 miles. The comet's tail is very nearly empty space.

Not quite, however. A comet's tail is also a physicist's delight. A comet has no magnetic field of its own, but near the sun it is plowing through magnetic-field lines carried away from the sun by the solar wind, the outflow of charged particles rushing through space at close to 250 miles a second. The comet wraps the field lines around itself like a spoon pushing through a pot of boiling spaghetti. The comet creates charged particles of its own. As it nears the sun and its frozen-

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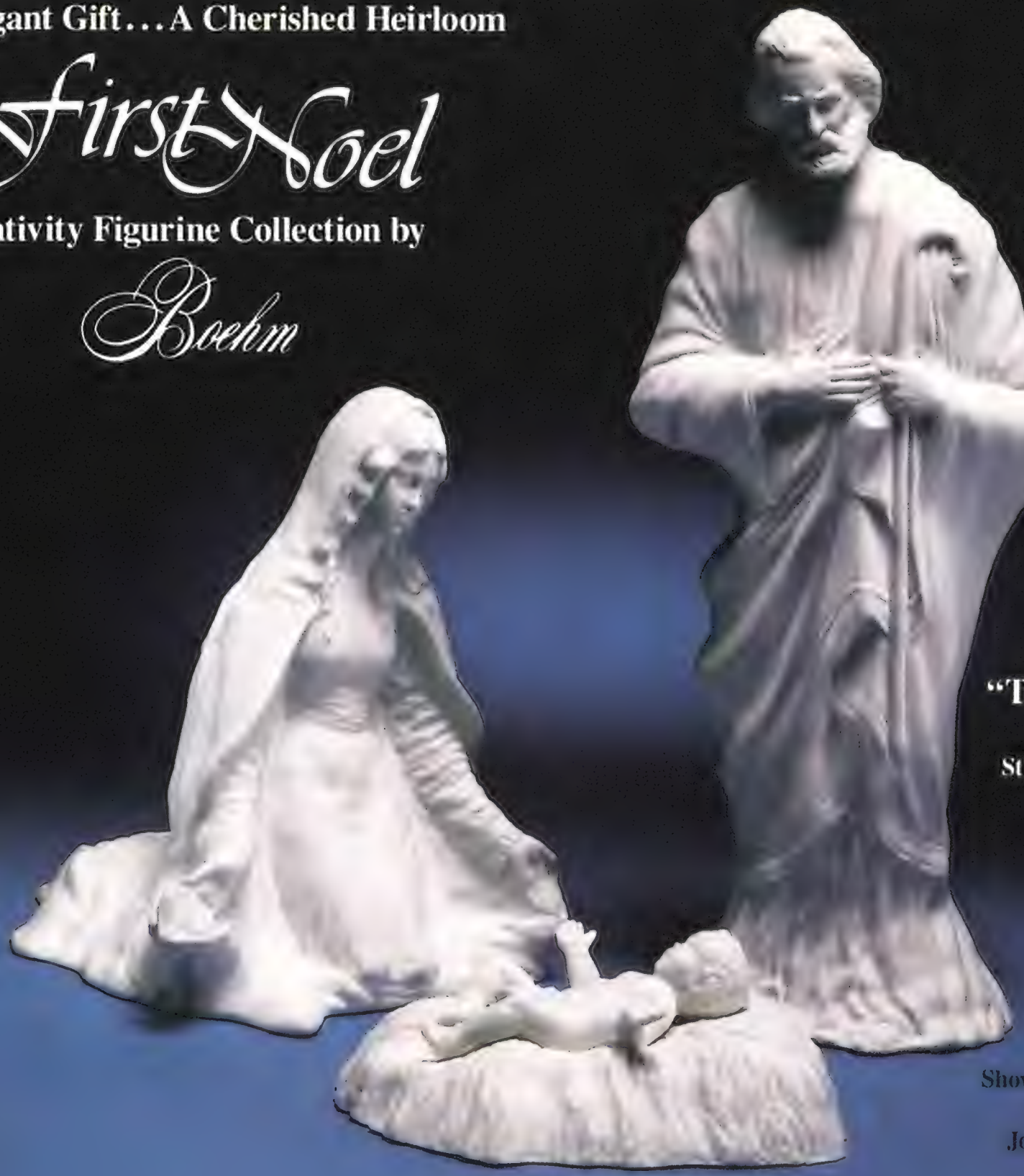

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surface temperature rises to that of Antarctica, it exhibits what John C. Brandt of Goddard calls a "snowstorm in reverse": frozen materials begin to sublime, rising from the surface as they go directly from the solid to the gaseous state. These molecules are rapidly ionized by ultraviolet light in the sunlight to form clouds of plasma—free electrons with a negative charge, and molecules, stripped of some electrons, with a positive charge.

A comet's tail, it seems, is a magnetized plasma. Scientists believe it may act somewhat like one of the particle accelerators that we spend so much money to build on Earth: charged particles moving through the magnetic fields are accelerated to energies as high as 100,000 electron volts (SMITHSONIAN, July 1975). Robert Hynds of Imperial College, London, said his instruments detected such cometary ions half a million miles from the comet.

Scientists believe the nucleus of Comet Giacobini-Zinner is a pancake shape about one and a half miles across, rotating approximately once every hour and 40 minutes. But ICE never saw it. The satellite went to within 4,900 miles of the nucleus, but carried no camera. It was designed and launched as the last of three International Sun-Earth Explorers (ISEE), which study the interaction between the solar wind and the Earth. Robert W. Farquhar, the ICE flight director, had written his PhD thesis on the concept that a satellite could be put into orbit at one of the sun-Earth libration points (designated by "L" and then a number)—the five places where the gravitational fields of the Earth and sun are such that a satellite moving at the correct velocity at any of the points will remain in formation with the two bodies.

The L1 sun-Earth libration point lies on a line between the two, a million miles from the Earth. Scientists wanted a satellite there to study the solar wind before it began interacting with the Earth. It would not do to have the satellite exactly at L1, because its transmissions back to Earth would be lost in the radio noise from the sun. Farquhar's "halo orbit" around L1 was the answer.

From 1978 to 1982, ISEE-3 faithfully reported on solar-wind conditions from L1. By then it was clear that the United States was not going to join the armada of spacecraft being sent to intercept Halley's, and Farquhar floated another idea. ISEE-3 could be sent a million miles away from the Earth on the side away from the sun, far down the Earth's own magnetic tail (doing valuable science along the way), and then brought back to "crack the whip" around the moon and be flung off straight to the spot where Giacobini-Zinner would be on September 11. It had no engine, but the attitude-adjustment jets—small enough to hold in your hand—could be used to change its velocity and thus its orbit. ISEE-3 left its halo orbit June 10, 1982, spent nine months alternately exploring the Earth's geomagnetic tail and executing the series of lunar fly-bys that culminated on December 22, 1983, with ISEE-3 just 75 miles above the lunar landscape as it was whipped toward the comet and was renamed ICE.

Last September 11, Giacobini-Zinner, now known to its friends as G-Z, had its moment in the sun, so to speak. Deep-space tracking stations in Spain and Cali-

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fornia were tuned to its signals, now 2,500 times fainter than they had been from L1. The 1,000-foot radio dish at Arecibo, Puerto Rico, backed them up. The 90-inch telescope at the University of Arizona and the 120-incher at Lick Observatory were watching, as were the 84- and 159-inchers at Kitt Peak. At Greenbelt we watched G-Z as it appeared in a 16-incher at Cerro Tololo in Chile, in a picture moved by satellite from Chile.

Reporters packed the Goddard auditorium. At 6:35 A.M. local Earth time, Fred Scarf announced that his instruments showed ICE had crossed what seemed to be G-Z's bow wave at 4:31 and were finding "extremely high activity" and greater turbulence than expected.

At 7:05 the instruments were seeing cold plasma, a sure sign we were in the tail. The "cold" plasma reached a mere 30,000 degrees C, compared to an average of 200,000 degrees outside in the solar wind. But temperatures in this context are a measure of molecular motion, not heat a person would feel if he were there. The comet's plasma tail is close to a perfect vacuum.

At 7:16 the instruments were still seeing cold plasma, meaning the tail was larger than expected. The scientists had expected ICE to be in the tail from five to seven minutes, but it ended up spending 18 minutes there. "We still could run into a golf ball," cautioned project scientist Tycho von Rosenvinge, "but it looks good." Jubilant that ICE was going to survive the encounter, the scientists began discussing the next leg of comet studies that would send ICE upwind of Halley's.

Along about now the mission scientists are finishing up their preliminary papers on the fly-by. They will be talking about magnetic and electric fields, about the high-energy physics going on in the tail, about the apparent absence of any dust particles larger than one ten-thousandth of a gram. ICE will be heard from again in March when it flies upstream of Halley's. But by 1988 it will be so far ahead of the Earth in our mutual travels around the sun that its signals will be too weak to hear. That is not the end, however. Mark August 2, 2012, on your calendar. ICE will return to the vicinity of the Earth then, and Farquhar believes it will be possible to fly it by the moon once more and put it into Earth orbit. Then, he suggests, we can pick it out of the sky and put it on display at the National Air and Space Museum.

In the meantime, I'll be out on that hill again, looking for Halley's itself. For all the hoopla, it may not be much easier to find (p. 160). It will be faint in December, and low on the evening western horizon in January. After it swings behind the sun, it will be very low in the eastern predawn sky in March and April.

Whether I find it or not, I'll be marveling. They tell you at naval ship-handling school that seeing a single white light at night in international waters can mean any one of 34 different things. Astronomers, I've known for years, can look at a single point of light and tell you how hot it is, how old it is, what it is made of, how fast it is spinning and so on. But now I'll be thinking about people who send a broken-down spacecraft to meet a comet I can't see through a good-sized telescope. And marveling anew.

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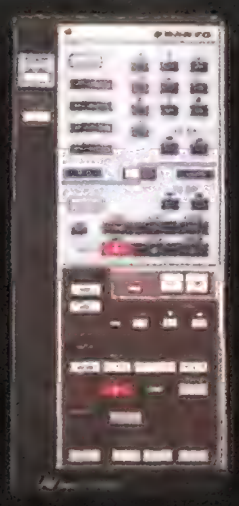

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By Donald Dale Jackson

Around the world in 1,392 days with the Navy's Wilkes—and his 'scientifics'

As a captain he was resented, but in 1842 he brought back enough data and specimens to put American science on the map for good

Painted a year after the voyage, hard-driving Charles Wilkes looked uncharacteristically indulgent.

The breeze they had been awaiting for three days finally began to stiffen the sails of the six ships of the United States Exploring Expedition on the afternoon of August 18, 1838. Whistles shrieked, signal pennants fluttered and anchors were weighed. Lt. Charles Wilkes on the flagship *Vincennes* led his squadron out of Norfolk, past Cape Henry on the Virginia shore and into the Atlantic.

Wilkes and the 490 sailors and civilians who shipped with him were bound for the southern latitudes, for South America and Australia, for the South Pacific and the polar sea that hid the mysterious land at the bottom of the world. Theirs was the first great American naval exploring expedition, the first to blend science and exploration with maritime commerce, and the first signal to the Old World that a new naval power had arrived in this twilight of the age of sail.

In three years and ten months, the men of the Wilkes expedition would confirm the existence of Antarctica. They would chart islands and harbors around the world. They would gather so many scientific specimens—plants and animals and shells, rocks and fossils and cultural artifacts—that new museums, including the Smithsonian Institution itself, would have to arise to hold them. They would feast with kings and fire rockets at cannibals, sign trade treaties and venture gingerly into international politics, and they would show the flag everywhere.

This ceremonial Maori ancestor-carving with sinister eyes was among the objects the expedition collected.

Some of them would die at sea, a few would fall in combat, dozens would desert, and many of the squadron's 53 officers would return with a fierce loathing for their gifted but stiff-necked and endlessly demanding commander. Trouble and turmoil had beset the expedition before it set out and would hound it throughout the 87,000-mile voyage (see map, p. 51). More trouble would be waiting when the explorers got home, with only two of the six original vessels.

The scope and ambition of the expedition is evident

Flagship *Vincennes*, in detail from painting by Wilkes, collects Antarctic ice to melt for drinking water.

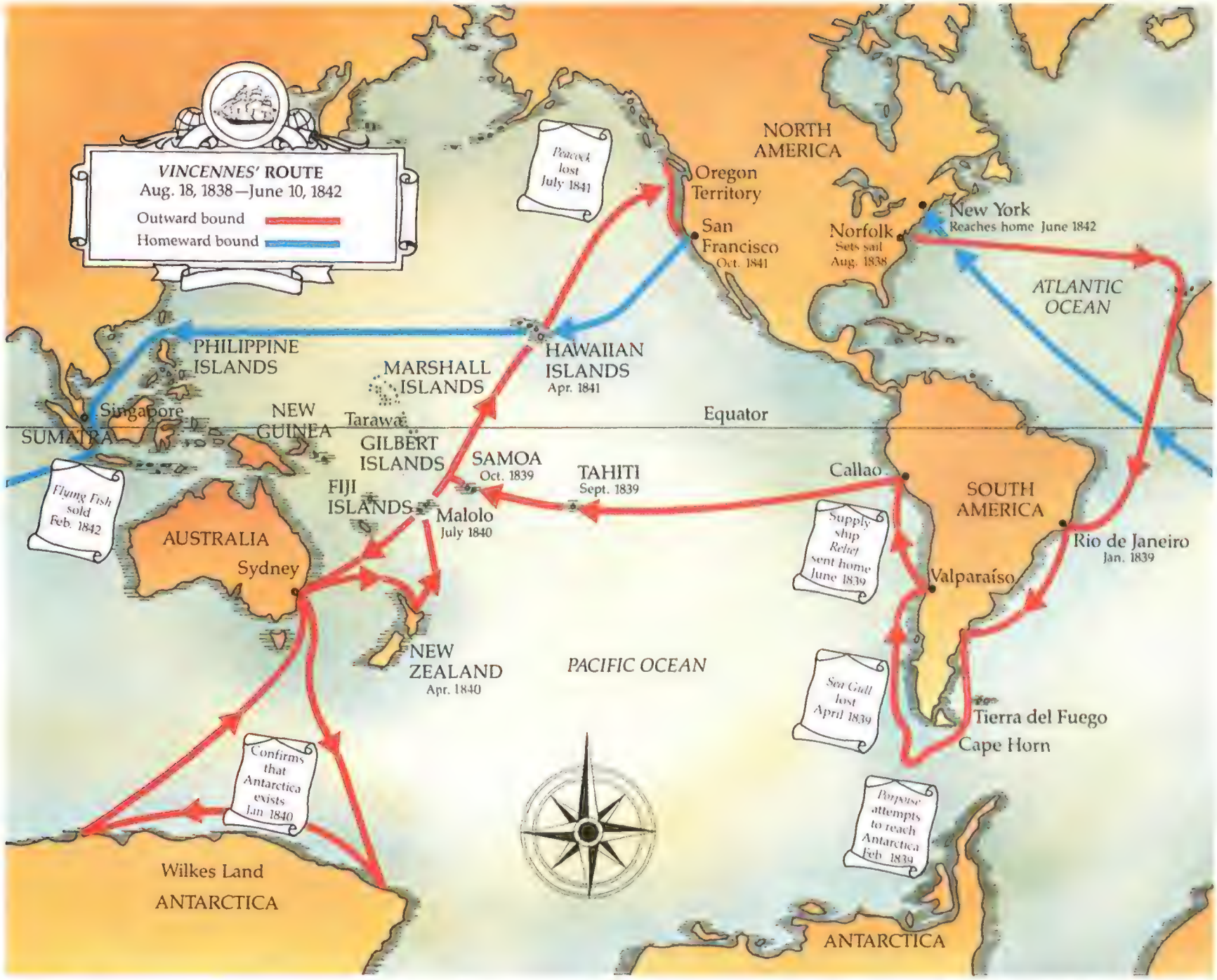
in a dramatic new show that opens this month at the National Museum of Natural History (for details see *Highlights*, p. 244). One goal was commercial, to make the oceans safe for the great New England whaling fleets and China traders. American ships had foundered on uncharted reefs, Yankee crewmen had been massacred and sometimes eaten by Pacific islanders—good nautical charts and trade agreements were essential. American science was also eager to broaden its horizons, and another part of the squadron's mandate was to study the natural world. But the expedition's ultimate purpose was best expressed by its most passionate champion, peripatetic Ohio editor Jeremiah Reynolds: to bolster "national dignity and honor."

Yet for more than a decade it seemed that nothing would get the vessels afloat. Reynolds campaigned hard in the 1820s, but a House-passed bill endorsing the idea in 1828 died in the Senate. By 1836 Reynolds had gilded his pitch with the beguiling notion that American ships might "even circle the globe within the Antarctic Circle and attain the pole itself." Congress at last appropriated money, but political bickering and the opposition of a lackluster Navy Secretary stalled the project two years more.

When Wilkes was finally named commander in March 1838, a chorus of protest rose from senior officers who contended that he lacked the rank and seagoing experience for the job. A New York aristocrat, not yet 40, with 20 years of Navy service behind him, Wilkes was indeed short of experience at sea (38 of his 40 fellow lieutenants had put in more time afloat), but he had charted the Georges Bank and was one of the most scientifically-minded line officers, an expert on navigation in many ways ideally qualified to lead.

Bound for Rio and points south

En route to their first major port of call at Rio de Janeiro, the officers, civilians (seven scientists and two artists) and crewmen in the squadron had a chance to get acquainted with one another and with their ships. The two largest vessels, *Vincennes* and *Peacock*, not much more than 100 feet long, were sloops-of-war with two-thirds of their guns removed. The two-year-old *Porpoise* was a 224-ton brig, *Relief* a provision-toting storeship that invariably lagged behind the others. Two sleek little pilot schooners carrying 15 men each, the 110-ton *Sea Gull* and 96-ton *Flying Fish*, completed the armada. The on-board amenities ranged from cramped and spartan cabins to a few lushly decorated quarters like one occupied by the rich and ebullient William Reynolds, a "passed midshipman"—a five-year veteran—on the 780-ton *Vincennes*. He wrote home that it included plated candlesticks, damask couches, crimson curtains, and "various other elegancies."



Flotilla ended by circumnavigating the globe. But as map shows, its main areas of exploration, chart making and specimen hunting were the American Northwest, the islands of the Pacific, and Antarctica, south of Australia, a continent whose official existence wasn't confirmed until Wilkes did so early in 1840.

Peacock, under the squadron's second in command, easygoing Lt. William Hudson, was in the worst condition. Workmen at Norfolk Navy Yard had painted over its rotten masts and spars and allowed it to set sail with a leaky hull and rusty pumps. The ship would need a month's repair work at Rio before it was ready for Cape Horn and the Antarctic.

William Reynolds, for one, was sure that in Wilkes the squadron had "the most proper man who could have been found in the Navy to conduct this Expedition," but it was apparent from the start that the commander meant to keep his own counsel and run an exceedingly taut ship. He confided the expedition instructions and itinerary to no one, and he cultivated what he later described as a "martinette" posture to foster discipline. Slight of build, with dark hair, a long nose and a ruddy complexion, he seemed to be everywhere on his ship, to see and hear everything down to the slightest inflection in an officer's tone.

He was also unmistakably serious about their scientific objectives. At Rio, which the first ships of the squadron reached on November 21, 1838, he rebuked two officers who climbed Sugar Loaf Mountain for neglecting to take along instruments to measure the elevation and thus render the climb "useful." The chastened officers promptly made the climb again with the necessary instruments. At every chance the scientists, known as "scientifics" to the Navy men when they weren't being called "bug catchers" and "clam diggers," fanned out to collect shells, birds and fossils. Reynolds marveled at the industry of "those headlong, indefatigable pursuers of birds, beasts, & fishes," while observing that "all they did was Greek to us."

The squadron left Rio on January 6, 1839, rounded

In the May issue, Donald Dale Jackson wrote about the Smithsonian's participation in an expedition to Venezuela's misty mountain, Cerro de la Neblina.

Trying to beat to windward in huge seas near Antarctica, schooner *Flying Fish* and brig *Porpoise* endure the kind of dangerous and exhausting punishment that wore down ships as well as men.

Cape Horn without difficulty six weeks later and arrived February 19 at Orange Harbor south of Tierra del Fuego, the staging point for the first of two forays into the Antarctic. Wilkes left *Vincennes* and *Relief* behind and sailed south in *Porpoise*, taking *Sea Gull* for company. *Peacock* and *Flying Fish* were to sail a southwesterly course and rendezvous with them later.

With the Antarctic summer already well advanced, daylight hours slowly diminished. This cruise into the polar sea was abruptly cut short by fog, blizzards, and ice which coated the rigging and soon sheeted the decks. Words fell from mouths, one officer reported, "and seemed to freeze before they reached the ear." The icebergs were fantastic—opal, green, even black, another man wrote, like "the ruins of some ancient city." The heavy-weather clothing the men had been issued turned out to be shoddily made and worthless. None of the four sailing ships clearly sighted the still-unknown mainland of Antarctica (American sealers had actually stepped ashore on Antarctica 18 years earlier, but they had kept their discovery secret).

The 15 men aboard little *Flying Fish* suffered the most. James Palmer, the ship's medical officer, described a 30-hour gale with seas "rolling in mountains over the schooner," shredding her foresail and smashing her boats. The men wrapped their feet in blankets, but no one could get really warm. They were bruised and battered and the doctor reported half the crew was "almost disabled by ulcerated hands and swollen limbs." One had a fractured rib. Palmer's first brush with the perils of polar weather intimidated him. "It is impossible," he wrote, "for any one to fancy the awful interest of such a scene."

Relief, meanwhile, with most of the scientifics aboard, survived a grueling ordeal while exploring the ever-dangerous Strait of Magellan. During a vicious storm they anchored near Noir Island, but the pull of wind and sea broke three of the ship's four anchors. The lone remaining anchor held at first then began to drag. At one point the ship was battered to within a few dozen feet of the rocks. The men gathered on deck, ready to leap overboard when the end came. Geologist James Dana, later to be one of America's most eminent men of science, wrote that the ship "careened as if half mad." The anchor broke off, but a fluky wind helped the ship reach the open sea and

safety, "sounding a dirge with her dragging chains."

The stay at Orange Harbor in February and March 1839 proved to be what Wilkes would call "the turning point" in squadron discipline. Several officers complained when Wilkes assigned command of the schooners to junior men, and they grumbled about his practice of shifting officers from ship to ship, though he did this partly so that all hands would be familiar with each others' responsibilities to the expedition as a whole. The commander detected a "mutinous cabal" among the disaffected and at the first opportunity decided to send two of them home—one was Lt. Samuel Lee, of the Lee family of Virginia. Reynolds' ardent admiration for his captain had cooled. He was writing darkly of the "malignant propensities" of a man who treated subordinates like "so many stones."

From Tierra del Fuego the ships sailed up the west coast of South America, pausing at Valparaíso, Chile, and then Callao in Peru. But when the fleet reassembled at Callao, the schooner *Sea Gull* was missing. "I am almost afraid to write it," Reynolds confided to his journal, "but we are fearful she and the poor fellows in her are lost. God help them." The schooner was last spotted off False Cape Horn on April 28 shortly before a gale. No trace of ship or crew was ever found.

Wilkes' reaction to a flurry of desertions and a drunken outburst ashore in Peru demonstrated his no-nonsense style of discipline. Some offenders were punished with three-dozen strokes of the lash, although the maximum number of lashes permitted by naval regulations without formal court-martial proceedings was only 12. Wilkes later contended at his own court-martial that he lacked time to convene a court.

Shortly before they left Peru, Wilkes concluded that the squadron could do without the laggard *Relief*, which he ordered home, transferring her scientifics to *Vincennes* and stuffing her with bird skins, minerals, dried plants and marine specimens to be carried back. Now down to four ships, in mid-July the squadron headed for the ripe temptations and culture shock of the South Sea islands. When two crewmen died of disease, they were buried at sea in a ceremony that a medical officer aboard the *Vincennes* found appallingly casual. The sailors were lining up for their daily grog ration as their shipmates expired, and a few hours after the burial they were dancing on the forecastle. "Pray God I may not die at sea," the doctor wrote.

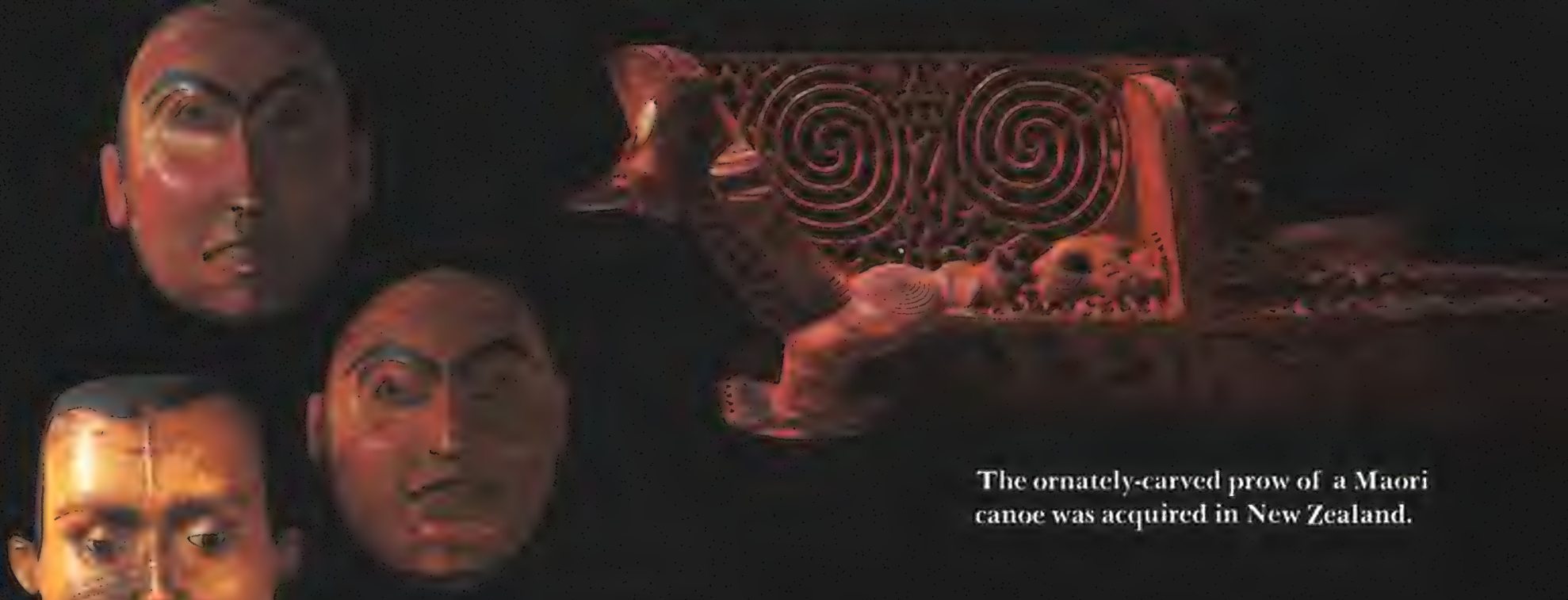
Wilkes issued orders barring the use of force against Pacific islanders except in self-defense and demanding that his men exhibit "peace, good will and proper decorum to every class." But this generous resolve failed to survive their first contact with Polynesians at the island of Reao, about 900 miles east of Tahiti. When spear-carrying natives menaced a boat party, Wilkes first tried to parley. When that failed, he fired off a round of mustard-seed shot, which caused the islanders to retreat with "deliberate dignity."

But a month later, they dropped anchor in paradise. Tahitians welcomed the Yankee voyagers with fruit and eggs, collected their soiled linen so the wives could wash it, and generally offered an enchanting hospitality. "Everything was harmony & playfullness & good humor," Lt. Henry Eld of New Haven, Connecticut, noted. "What an example these people set to us who pretend to call ourselves civilized." Despite the presence of missionaries on the island, the moral tone was still free and easy—"unbridled licentiousness," scientist Joseph Couthouy clucked. When an exploring party of scientifics and native guides came to a river, the Tahitian girls cheerfully stripped and swam

Prime grouser during voyage was Midshipman William Reynolds.

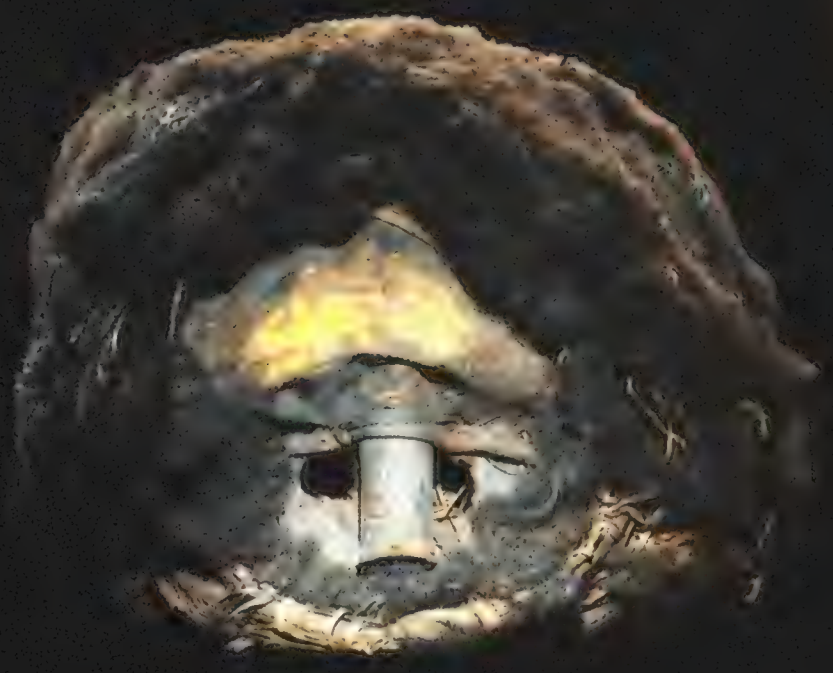
Greatest of the "scientifics" was famed geologist James Dana.

The cantankerous conchologist Couthouy clashed with Wilkes.



The ornately-carved prow of a Maori canoe was acquired in New Zealand.

Expedition got masks made by Pacific Northwest Indians from Hudson's Bay Company.



Unusual Fiji mask, used during ritual dance, had human hair and wore a bemused expression.

These war clubs, used both for bashing and throwing, are from the Tonga and Samoa Islands.

across. Native men offered their wives to the visitors. To counter the temptation to desert, Wilkes offered $150 for return of skedaddlers; several were brought back, bound hand and foot to poles like slain deer.

A week after their reluctant farewell to Tahiti, the voyagers settled into the Samoan group for a month-long stay. Here the women were not like those they had left behind—they were "remarkably domestic and virtuous, exhibiting a strange contrast to those of Tahiti," Wilkes observed. The Americans sounded the channel depths, plotted the precise locations of the numerous islands and gathered boxloads of biological and anthropological specimens. Surveying was exacting work, Reynolds wrote, since "a moment given to relaxation might spoil or injure the whole."

Wilkes seemed indefatigable, relentless in his dedication to his mission, a stern taskmaster who worked longer and harder than any of his men. "A more per-

Model of Chinook Indian cradle.
Baby was elaborately laced in,
and cradle was hung from tree.

A birdlike mask from Oregon
had painted beak of carved
wood, was trimmed with down.

Rattle shaped like a stylized raven
was collected on northwest coast.

Javanese kris in its fine wooden sheath
was acquired in Singapore, near end of trip.

Mysterious Maori ornaments,
carved out of greenstone,
had vaguely embryonic look.

severing man never lived," the expedition's armorer declared. Lieutenant Eld observed that "like a cork he cannot be sunk." He took an active interest in everything, to the occasional dismay of the scientifics. The commander complained to Couthouy, a shell specialist, about the rank smell of his on-board coral collection, and followed up with an order banning coral, shells and "anything else that may produce a bad smell" belowdecks. Couthouy clashed frequently with the skipper—"the most troublesome fellow I had to deal with during the cruise," Wilkes called him.

In late November 1839 *Vincennes*, *Peacock*, *Porpoise* and *Flying Fish* glided into the beautiful harbor at Sydney, Australia. Here the men reveled in waterfront pubs while their ships were overhauled and provisioned for their second cruise to the Antarctic. To some Sydneyside salts the Yankee ships were not so sturdy as the vessels in the British and other expeditions

Multicolored fruit dove (top) from Samoa was one of some 700 bird species found on voyage.

Sea anemones from reefs in the Tuamotu archipelago were variously depicted by artist Joseph Drayton.

Naturalists thought these two Fiji musk parrots were different stages of one species.

Peale named this white-colored kingfisher from Tutuila in Samoa. Later it was renamed after *him*.

Drawing of Polynesian rat (*Rattus exulans*) shows young and adult (top).

that were then also trying to find and map the Antarctic. They seemed frail, with no watertight compartments, but had well-armored hulls. In Sydney, *Flying Fish* gained new masts and rigging. Geologist Dana, naturalist Titian Peale and the other scientists were to stay in Australia and rejoin the party after the Antarctic interlude. On the day after Christmas the four ships nosed out of the harbor and turned south.

Penguins rose out of the fog, *Flying Fish* officers noted, "stared wildly at us & then plunge under again, uttering a most doleful cry." The weather was initially mild. The men even played shuffleboard for exercise and coiled the leadline to the music of the fiddle and sea chanteys as they took depth soundings. The first icebergs were sighted at 61 degrees south on January 13, 1840, and soon afterward they encountered ice islands and pack ice. Reynolds and Eld were aloft on the masthead of the *Peacock* on the 16th when they

Coris flavovittata, a kind of wrasse, was exotic creature to American scientists when they found it in 1841.

Two-toned pigeons were plentiful in forests of Aurora Island near Tahiti.

Near Puget Sound the "scientifics" captured new species of garter snake.

Two snow petrels were painted from specimens collected during first approach to Antarctic.

simultaneously saw what they were certain was land. They grabbed a spyglass, through which they gazed at mountains "towering over the Field Ice" and stretching south and west. Inexplicably, and to their unending regret, the sighting was not recorded in the ship's log. Three days later they saw more snow-blanketed mountains which many of their shipmates agreed could only be land. Barrier ice precluded a landing. (A rival French expedition was luckier. On January 19, the corvettes *Astrolabe* and *Zélée* sighted the Antarctic highlands, and on January 21 sent launches in past the barrier ice to plant the tricolor on the frozen continent.)

On the 24th, *Peacock* struck a large berg which wrecked her rudder and set the vessel adrift in a bay filled with enormous ice islands. Her inner planking was on the point of being crushed between bergs when Hudson's crew managed to maneuver her through a

narrow channel, thumping and grinding against the ice and gradually working the ship to open sea.

Wilkes and *Vincennes* meanwhile sailed in sight of the Antarctic continent on the 28th, and again conclusively on the 30th. The ship continued westerly for some 1,500 miles with land frequently in view, confirming its continental dimensions. The commander, whose name this region of Antarctica now bears, invited his officers to join him in toasting their achievement with champagne. "Our water," Titian Peale had written his daughter, "is generally warm, and smells bad." But among the icebergs there was plenty. Ships simply "watered" by cutting chunks of ice to melt and, in one case, getting 500 gallons of pure water from a pool on the indented top of a berg. Still, on February 21, with the sick list lengthening and daylight hours diminishing, Wilkes turned north.

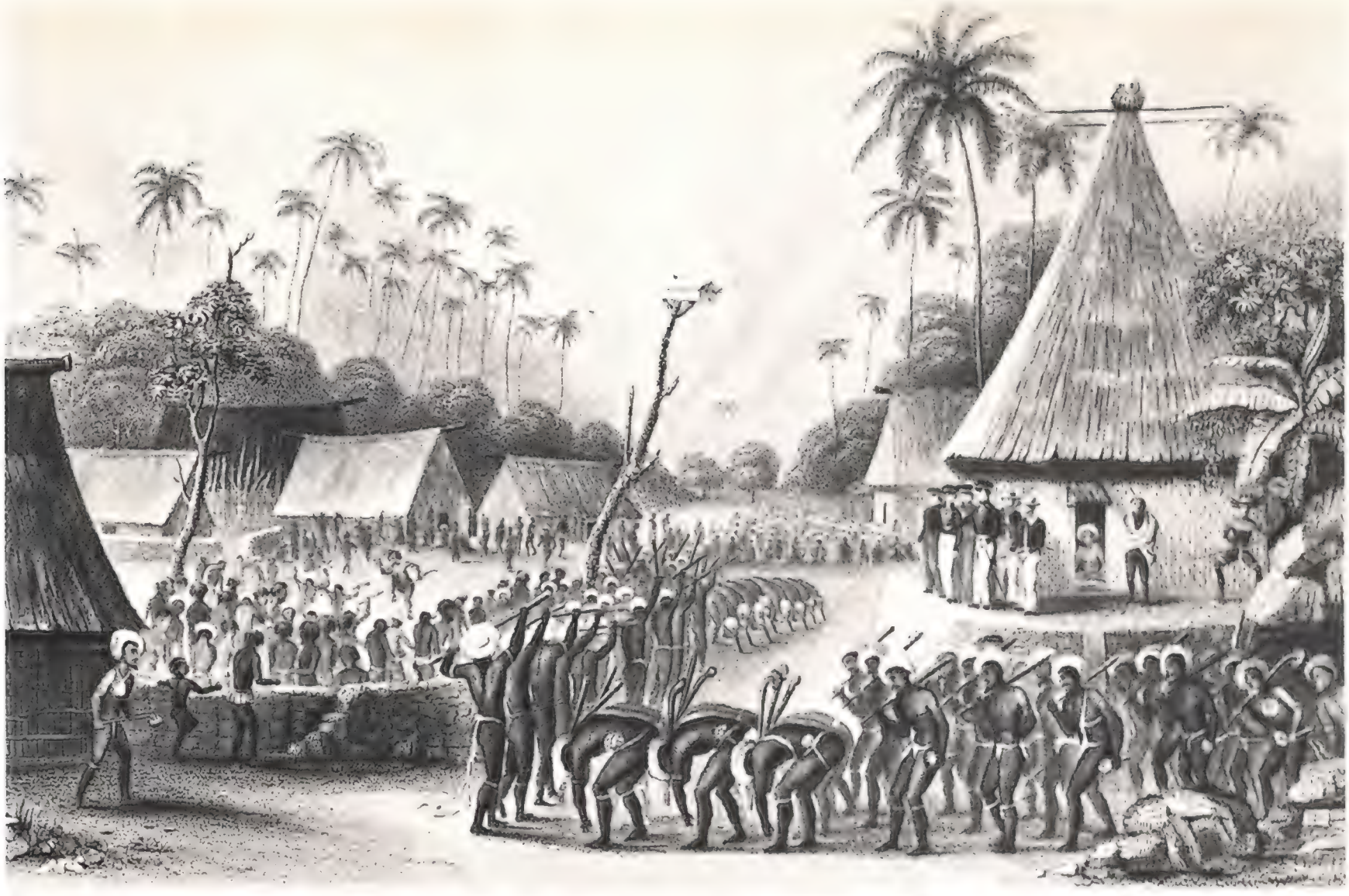
Back in New Zealand a month later, the men of the expedition compared adventures and totted up the cost. *Flying Fish* had battled heavy seas and failed to sight land, turning back when her roster of healthy crewmen dwindled to three. The hull of *Peacock* had been dangerously battered. The men on *Porpoise* had not seen Antarctica either, but on January 30 they had beheld the mysterious spectacle of two strange ships, which turned out to be *Astrolabe* and *Zélée*. It might have been a scene from an Antarctic comic opera: the rival explorers approached each other to communicate, then veered away in misunderstanding. The French later claimed to be the first to sight Antarctica. Wilkes' claim was disputed until the late 1950s when two Australians retraced his path. In April the squadron set off for the Fiji Islands. Geologist Dana and Captain Hudson of *Peacock* dispatched a congratulatory note to Jeremiah Reynolds in New York, telling him that his "expectations respecting the Southern Continent have been realized."

The Fijis, where cannibals dwelled on islands ruled by bushy-haired chiefs, proved to be as daunting as the Antarctic. The voyagers' accomplishments there were staggering. In three months' time, working in small launches, skin peeling from sunburn and stinging from salt, crews surveyed a labyrinth of shoals and reefs, charting more than a hundred islands. They gathered some 750 kinds of plants, 118 new coral species and 1,200 artifacts—the best artifact collection in the outside world. They negotiated trade treaties with island chiefs. Wilkes was feted with a colorful "club dance" (opposite) and presented with a stack of war clubs. The commander thought the accompanying noise "could not be called music, but they kept good time."

The Yankees at first were skeptical of the natives'

Captured cannibal Vendovi was drawn by expedition artist Agate.

In Fiji, murder of two officers led to the destruction of village and many inhabitants.



Friendlier welcome on another Fiji island included a ceremonial club dance, after which islanders gave Wilkes some clubs. Expedition spent three months in Fijis, collected 750 plants, 118 new kinds of coral.

reputed cannibalism. Then a group came aboard *Vincennes* gnawing on the remains of a freshly-cooked enemy. Reynolds saw a man munching a human eye "with the greatest possible relish." He and his shipmates experienced a nervous and terrible feeling of horror and disgust, though the scientifics later procured the skull for their collection. The enmity of such people was clearly something to be avoided, but before long it was aroused.

The first clash followed the theft of one of the squadron's cutters. The sailors burned a village in retaliation. A chief named Vendovi, who led the killing and eating of a band of American seamen seven years earlier, was lured aboard the *Peacock* and taken prisoner. He was to be taught "that to kill [and eat] a white person was the very worst thing a Fejee could do."

The worst trouble erupted on Malolo Island when the standard practice of exchanging hostages to ensure peaceful behavior on both sides led to misunderstanding and native violence. Two officers, one of them Wilkes' nephew, were speared and clubbed to death in a skirmish on the beach. Then the Americans attacked a fortified town with muskets and incendiary rockets, killing 87 villagers. Next day Wilkes accepted the island's abject surrender, after having the survivors water and provision all his vessels as tribute.

In August the armada headed northeast for the Hawaiian chain, then known as the Sandwich Islands. Once there, Wilkes decided it was too late to continue on to his next (and last) important stop, the Oregon Territory, so he dispersed the squadron. *Peacock* and *Flying Fish* would revisit Samoa and survey several other islands, the lucky tars on *Porpoise* were ordered to Tahiti and the Tuamotu group, while *Vincennes* conducted a thorough survey of Hawaii. The four ships were scheduled to reunite off the Columbia River in the spring of 1841.

Wilkes' prickly relations with his subordinates kept growing worse. The once-worshipful William Reynolds was regarded by Wilkes as part of a "cabal" conniving against him. Reynolds described his commander in a letter home as a "fake and malignant villain." Lt. Robert Pinkney, who had commanded *Flying Fish* in the Antarctic, drew the commander's wrath with a disrespectful letter that would culminate in court-martial charges against them both. The troublesome conchologist Couthouy was dismissed for promoting dissension, and a surly seaman named Peter Sweeney was court-martialed, lashed in a boat while it circled the fleet and dumped ashore in Hawaii. For 18 straight days Wilkes held courts-martial.

Seamen in the Navy served about two-year hitches in

those days and, with their terms now up, many crewmen left the squadron in Hawaii, making matters worse for the expedition commander. In the Gilberts (where they charted a small island called Tarawa) some of *Peacock*'s men tangled with angry natives once again after a crewman vanished, presumably due to foul play. Meanwhile, back in Hawaii, Wilkes led a 42-day excursion to the summit of Mauna Loa where the scientists examined the volcanic crater, taking its depth and studying its lava flow while the officers took meteorological readings. An American missionary found some Navy sailors well-behaved and pious, but others "notoriously lewd."

Fourth of July, roast ox and "football"

Vincennes and *Porpoise* arrived in the Pacific Northwest in late April 1841. The Oregon Territory, huge, ill-defined and much of it claimed by both Britain and the United States, was officially neutral ground, populated by a few American settlers and fur traders working for Britain's Hudson's Bay Company. Greeted hospitably by the British, Wilkes began what was perhaps his most important mission, a series of land and water surveys that resulted in the best map yet produced of the region. The commander believed that the territory would eventually become part of the United States, but he kept his opinion to himself. Even so, his men celebrated the Fourth of July with an ox roast and a "football" game which the skipper started by tossing in the ball and crying, "Sail in, my shipmates!"

Long overdue, *Peacock* finally reached the treacherous shoals at the mouth of the Columbia River in mid-July, but this would be the last landfall for the ill-starred three-master. The ship went aground and slowly succumbed to the hammering of the waves. Though all hands escaped in the boats, the entire insect collection was lost. Wilkes bought a replacement brig from the British and named it *Oregon*. While publicly exonerating Captain Hudson, he privately held his veteran deputy responsible for the disaster.

Wilkes sailed down the coast to the little Mexican-ruled village of Yerba Buena in San Francisco Bay, where he met an overland party he had dispatched to explore the rugged country that was the Oregon Territory. One of the trekkers was the geologist Dana, who reported to the baronial John Sutter at his fort on the Sacramento that he had seen near Mount Shasta "the strongest proof and signs of gold." The astute and conscientious Dana had also heard Indian tales about a great eruption 40 years earlier at a peak north of the Columbia called Mount St. Helens.

When they left California in November their mission was nearly complete. They took the long way home, crossing the now-familiar Pacific and stopping at Hawaii, Wake Island, the Philippine Islands and Singapore, where the faithful but travel-worn *Flying Fish* was sold—and soon converted into an opium runner. Wilkes triggered a new round of grumbling by ordering *Porpoise* to pause in Rio on the homeward leg after the Cape of Good Hope. This left the commander and the flagship *Vincennes* to sail into New York harbor and whatever reception awaited them.

It turned out to be considerably less than they expected or deserved. The home folks seemed only mildly interested when the ship dropped anchor at the Brooklyn Navy Yard on June 10, 1842. The *New York Herald* ran a short story summarizing the expedition's work and reporting that their Fijian prisoner, Vendovi, was ill (he died the next day) "in consequence probably of having no human flesh to eat." Wilkes was received coolly by the Navy Secretary—a new administration had taken over in their absence—and when he visited President John Tyler at the White House he suspected that the President didn't know who he was.

The tensions that had hissed and sputtered during the long voyage boiled into a series of court-martial charges against Wilkes and four junior officers. The commander listened stoically as he was accused of oppression, cruelty, disobedience of orders, illegal punishment and conduct unbecoming an officer. Alert as always, he watched a parade of his former lieutenants come forward to testify against him. When his own turn came, Wilkes delivered a 53-page point-by-point rebuttal and then deposited his "honor, dearer than life" in the court's hands. Reynolds thought his statement "arrogant, careless, dictatorial, full of malicious abuse." The court found him guilty of 17 counts of illegal punishment, exceeding the permissible number of lashes without a court-martial—the one charge, he said, that caused him "the least anxiety."

A "puerile irritability of temper"?

He was sentenced to be publicly reprimanded by the Navy Secretary. For the proud and hypersensitive Wilkes, who believed that his own flinty integrity and his country's honor were inseparable, the verdict must have stung like a dozen lashes.

What are we to make of this rigid, driven man and his unhappy expedition? The published histories have judged him harshly, while acknowledging his voyage's contributions to nautical science and natural history. The animosity of many officers and civilians who served under him is evident. A contemporary magazine, reviewing the five-volume narrative of the cruise that Wilkes published with startling speed in 1845, chided him for "a puerile irritability of temper, such as wears out the heart of loyalty by the perpetual droppings of discontent." He sailed into trouble again during the

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Crewmen measured trees in Oregon, but main project was surveying the vast and disputed territory, thus completing first coast-to-coast map of United States.

Civil War, when his seizure of two Confederate diplomats on the British steamer *Trent* threatened the delicate relations between the Union and Britain and resulted in another court-martial.

But it must also be said that Wilkes was well-organized and energetic, with a zest for exploration and a passion for precision. His chief deputies on the exploring expedition remained loyal to him. The Navy absolved him of all but one rather paltry charge and he eventually retired a rear admiral. Perhaps his greatest exploit was simply ramrodding the expedition to a successful conclusion against all odds, leading his men and their frail ships to the polar sea and bringing most of them back alive. The scientist James Dana, a man given to careful judgments, expressed doubt that "we should have fared better or lived together more harmoniously" under any other commander, "and I am confident that the Navy does not contain a more daring or driving officer."

Many of the researchers and curators who have studied the man while preparing the Museum of Natural History's exhibition also admire Wilkes. Historian Jeffrey Stann is impressed with the commander's intellectual scope and range of abilities: "He was a man of thought and a man of action too." Says Armed Forces historian Philip Lundeberg: "Anyone who doesn't understand the responsibilities of command doesn't understand Wilkes. You needed a tough, demanding individual like Wilkes to do that job."

Wilkes brought the fierce dedication he had shown on the voyage to the organization and publication of the expedition's findings. Twenty-three volumes eventually were prepared; subjects ranged from the races of man to botany, meteorology and geology. The books, together with the accompanying maps, charts and artwork, constitute a legacy that ensures the expedition's continuing scientific importance—as Wilkes knew they would. He maneuvered for Congressional funding for the books as skillfully as he navigated the South Seas, and drove the scientists to produce as sternly as he drove his officers to follow orders.

The result was not only a massive work of scholarship but also the foundation for the expansion and professionalization of American science in the 19th century. The fields of botany and geology emerged as professional disciplines in part because of the pioneering work performed by expedition scientists under federal auspices. "A new set of professions emerged and the expedition hastened it," Smithsonian botanist Richard Eyde says. The era of the gentleman naturalist was passing. Observations by Wilkes' scientific cadre, particularly Dana, laid the groundwork for breakthroughs that his successors are still refining, such as plate tectonics and continental drift. Says Smithsonian historian Herman Viola, who had charge of putting together the new show, "The expedition was a scientific declaration of independence."

The specimens they brought back, more than 1,500 of which are on display at the Wilkes exhibition, were the bases of the vast study collections of plants, animals and artifacts now housed in Smithsonian museums. In fact, it was the existence of this material, and the need to make use of it, that led to the establishment of the Smithsonian as a museum in 1857. Some of the nautical charts the expedition produced were still in use a century later: the ships ferrying U.S. troops to Tarawa Atoll in World War II carried a Wilkes chart. His men surveyed 280 islands, mapped 800 miles of the Pacific coastline and charted some 1,500 miles of what is now Wilkes Land in Antarctica. They collected more than 4,000 zoological specimens including 2,000 new species, 50,000 plants and 2,500 artifacts—spears and clubs, masks and pipes and baskets.

By any measure the Wilkes expedition was a superb demonstration of American skill and perseverance. A nation which had not yet penetrated the wilderness within its own borders was already probing the planet's most distant and mysterious frontiers. Jeremiah Reynolds, the visionary who had packaged and sold the idea of the expedition, could feel vindicated. But a visionary's life can take strange turns. Reynolds wound up as a Texas banker.

Among voyage collections are coral, stuffed caracara (bird), Fijian nose flute, skull, Patagonian armadillo and Hawaiian necklace made from human hair.

By Robert Wernick

A little man who brought a Parisian era to vivid life

Broken in body, flaming in spirit, artist and aristocrat Henri Toulouse-Lautrec put his indelible stamp on a time and a place

Henri Marie Raymond de Toulouse-Lautrec-Montfa was born on a stormy night of 1864 in his grandmother's fortresslike old house which had grown over the centuries around a donjon of the medieval ramparts of Albi. Admiring relatives and servants made him aware from his earliest childhood that he was heir to an old and proud name in Europe. His ancestors had been counts of Toulouse, ruling over most of the South of France and entertaining troubadors at the most civilized court in Europe. A younger son of Count Raymond V had married the daughter of the Count of Lautrec in 1196, and an unbroken line had run from father to son ever since. The family glittered with diadems: dukes and counts without number, even a brother-in-law of Richard the Lion-Hearted. Henri Marie Raymond was to take a path of his own: he would lead a disorderly unconventional life and do things that would horrify his family, but in his way, down to his wretched end when he lay dying of alcoholism, syphilis and whatever else he could pick up on his primrose path, he never forgot family tradition.

He was, of course, an aristocrat with a difference. He was one of the cluster of French painters who at the end of the 19th century changed the world's way of looking at things and launched the adventure of modern art. He was a man of such penetrating eye and such vivid touch that he has impressed his own vision of Paris in the 1890s on posterity. The vision is all there, sharp and deep and often considerably unsettling, in a big show of more than 300 of his works currently at the Museum of Modern Art in New York. Supported by a grant from Mobil, it will be on view through January 26. There is also a show of drawings from the artist's birthplace, which still belong to the family, now on display at the French Cultural Services Gallery in New York; and, in New Brunswick, New Jersey, the Jane Voorhees Zimmerli Art Museum has a show comparing Lautrec with his contemporaries.

Guardsmark Inc., Memphis

Oil sketch opposite served as the basis for Lautrec's lithograph poster *Jane Avril at the Jardin de Paris.* Admired by Lautrec, she was the city's essence for him.

It has all become so familiar that it takes a wrench to remember that, after all, this is only one narrow corner of Paris, that there were millions of people in the 1890s who never went to ogle the ladies at the Moulin de la Galette, who never saw Jane Avril dance or Yvette Guilbert sing at the Moulin Rouge, never visited the racecourse at Longchamps or the fancy brothels of Montmartre.

Lautrec never had to worry about money. His family had come through the French Revolution successfully by lying low, and had held on to most of their immense possessions of land. They had once been at the heart of the ruling class and filled prominent posi-

Private collection

Lautrec was 26 when this portrait was taken in 1890. Child of cousins, he suffered from a form of dwarfism.

tions in state and church. But in 19th-century France they had nothing to do. French governments distrusted them, and besides, they regarded all French governments after 1830 as usurpers. They were waiting for the restoration of the rightful Bourbon King, the Count of Chambord, who the family thought should be crowned as Henri V. (Lautrec was named for him.) They might accept commissions in the armed forces, as did the painter's father, Count Alphonse, until his royalist principles and his total allergy to discipline led him to resign. For a man of his station, there was nothing to do afterward except look after his estates, hunt game and chase women.

Count Alphonse made a love match with his first cousin Adèle Tapié de Céleyran, who came of another landed and aristocratic family. Intermarriage was not uncommon in these families, and the results for their only surviving son (a younger brother, Richard, died a year after birth) were catastrophic. The parents blamed themselves for their child's afflictions, and modern medical opinion seems to hold that they were right. According to the latest study of the medical evidence, the boy suffered from a rare form of dwarfism called pyknodysostosis, which is more common in children of consanguineous parents than of others. Bones of the arms and legs do not have the spurt of growth common to other adolescents. The features of the face coarsen, the lips thicken and drool, the nose has a constant sniffle. All this was to happen to little Henri, who for the first 13 years of his life was known in the local dialect as *Bébé lou poulit*, the little beauty, the bright madcap child who was everyone's idol.

Life was a perpetual round of pleasures and excitements for him at the paternal Château du Bosc north of Albi, or the maternal estate, Céleyran, on the Mediterranean, or the beaches and harbors of the Atlantic coast. He was brought up surrounded by

Artist was obviously delighted at idea of posing for himself in montage made by Maurice Guibert, c. 1890.

Musée Toulouse-Lautrec, Albi, France

His dexterity with a brush and his sense of unerring design is evident in Lautrec's self-portrait of 1880.

An ardent ham before the lens, he liked to dress up. His love of Japanese prints made this pose inevitable.

forests and gardens, grainfields and vineyards, kennels and stables. There were animals everywhere. His grandmother Lautrec often went walking with a monkey on her shoulder. There were hawks and hounds, ferrets and cormorants. Above all, there were horses. "In our family," his father once said, "we christen a child at once, and then put him on a horse." One of his early memories was of his grandfather Count Raymond, known as the Black Prince, who was out hunting alone one winter day and rolled down a precipice, blew a blast on his horn with bloodied lips—and died. The three sons of the Black Prince spent most of their lives on horseback; they could not wait till Henri was big enough to join the hunt. As soon as he could walk, he was riding a pony. Soon he was forming his swarms of little cousins into cavalry troops. He spent happy hours with the grooms in the stables. Later on in life, when they asked him what he missed most from the days before his debility, he answered, "Horses."

He was self-willed, mischievous, a leader in all the children's games. He designed the costumes and the disguises, he spoke all the voices in the Punch-and-Judy shows.

His parents, after the first flush of romance, found themselves totally incompatible in character and tastes, and it was not long before they were living apart, though Alphonse in his unpredictable way might turn up at any time for dinner and might stay on unwelcome but irremovable for months or years as part of the household. In their radically dissimilar ways, they both had a great influence on the little boy. Adèle, the mother, was quiet, pious, well-read, practical in money matters, straitlaced, narrow-minded, totally devoted to her son.

"Certainly not my son"

She never really appreciated his work; when she was asked once to name her favorite painter, her reply was: "Certainly not my son." But she was fiercely proud of any success he had in his lifetime and fought fiercely for his fame after he died. She preserved every scrap of his work that he had not sold or given away. A selection was offered to the Musée du Luxembourg, which chose only one. She then gave the collection to the city of Albi, which now has one of the most popular provincial museums in the world.

Adèle always provided him not only with all the money he needed but with a home he might come back to anytime he was tired of his dissipations. She knew all about the dissipations, but she accepted with a steely resignation what she could see only as a deliberate destruction of body and soul. He was always glad to curl up in a chaise longue at her Paris apartment or at the Château de Malromé near Bordeaux, which

Art Institute of Chicago

La Goulue Entering the Moulin Rouge is dancer Louise Weber. She was a reigning star of Paris.

she bought. "I can do anything I like," he used to say, "since Mama keeps nuns in our old castle of Boussagues [still another family estate] who have nothing to do but pray for the salvation of my soul."

Count Alphonse was quite another kettle of fish, an eccentric of almost English proportions, a big bearded man who on occasion danced around the living room with a knife between his teeth, who went out hunting in coat of mail and cowboy hat. He used to ride his favorite white mare in the Bois de Boulogne wearing an Uzbek helmet with a red pennant fluttering from it; he would rein in the mare halfway through the ride, dismount and milk her, drink the milk, remount and continue. This inveterate huntsman and womanizer lost interest in his son when he realized the child could no longer hope to mount a horse. He did pass on to him, however, along with a taste for fancy costumes and disguises, a talent for gourmet cooking. He evidently liked his steak rare. A family recipe for Steak à la Lautrec: "Grill three steaks placed horizontally on top of each other. Serve the middle one." He also passed on a passion for drawing.

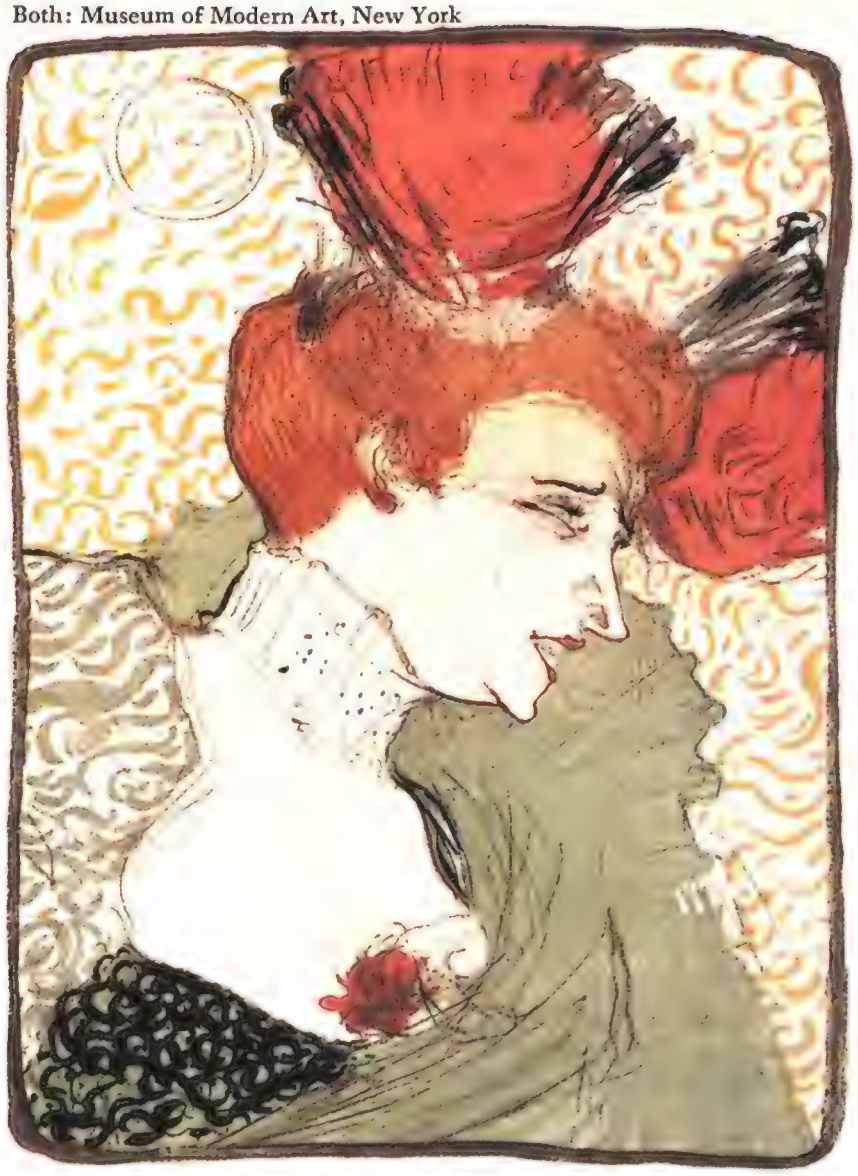
Count Alphonse and his two brothers shared a traditional family fascination with art. They used to sit by the fire for hours after the hunt and draw or paint or model clay. Their mother said of them that when they hunted a game bird they got three pleasures out of it, shooting, drawing and eating. The little Henri was watching and imitating them from the start. When he was taken, at age two and a half, to the christening of his brother, he asked to be picked up so that he could sign the register and, not being able to write, he announced that he would draw an ox.

The margins of Lautrec's schoolbooks were crammed with lively sketches of dogs, galloping horses and farm scenes. It has been speculated that he might have grown up as the family expected—to be a country squire in the family tradition, who would have casually turned out some lively works of art for his cousins and friends. But his life was changed for good when two falls, at ages 13 and 14, condemned him to months of immobility, his thighs in plaster, confined to bed or a wheelchair. At first his parents believed that his increasing physical debility was the result of the falls. They could not believe that anything constitutionally was wrong and he was dragged for years from doctor to doctor and beach to spa, subjected to all kinds of treatments and relentlessly prayed for. At the age of 16, when his features had long since thickened as the disease dictated, his father did a drawing of him showing the lean, handsome face of a Toulouse-Lautrec.

Bébé lou poulit was not fooled. He could look in a mirror. His growth stopped at just under five feet, and he knew he would spend the rest of his life tottering around on stunted legs. "I am alone all day," he wrote in a letter. "I read a little but it gives me a headache. I draw and I paint, as much as I can, so much so that my hand gets tired and when it begins to get dark I wait to see if Jeanne d'Armagnac [one of the cousins] will

A regular contributor on matters cultural and historical, Robert Wernick wrote last month about master millwright and restorer Robert Johnson.

Both: Museum of Modern Art, New York



Actress Marcelle Lender was the subject of a Lautrec lithograph at about age 33, at the height of her career.

Named for a dance, this clown at Moulin Rouge was Mademoiselle Cha-U-Kao, a favorite of Lautrec's.

come and sit by my bed. She comes sometimes and tries to distract me and play with me, and I listen to her speak without daring to look at her, she is so tall and so beautiful! And I am neither tall nor beautiful." It was the closest he ever came to complaining. Generally, he turned a resolutely cheerful countenance to the outside world.

Drawing and painting filled all his hours, and so they were to do when he could get around with crutches or a cane. He was a phenomenally hard worker. He studied with two fashionable Parisian painters and though they could never make a conventional painter out of him, he doggedly learned everything they had to offer. He had a sketchbook everywhere he went, and his pen or pencil was always running in fluid nervous lines through it, or on any other surface that was handy: tablecloths, menus, the plaster walls at Château du Bosc, where many of his sketches survive to this day. People who knew him could hardly count the hours he spent drinking at the nightspots and tomcatting through the sordid streets of Montmartre, and sometimes it led them to think of him as an amiable dilettante. But the sheer volume of his work is remarkable: before he died at 36, he had turned out more than 500 paintings, more than 350 lithographs and posters, more than 5,000 drawings.

He was 19 when he moved to Montmartre and plunged into the reckless, rowdy life of his bohemian artist friends. But he never cut himself off from his past. He went on visiting his mother regularly; he was unfailingly polite and affectionate with her. He was unfailingly polite and affectionate with all his family and with the servants back home in Albi. He could be a pleasant companion to everyone he chose to come in contact with. He never forgot, because he never had to remember, that he came from the top, the social pinnacle. The social distinctions which count so much in the lives of lesser people meant nothing to him. He found it perfectly natural to pass out at the opening of his show in London and snore through the visit of the Prince of Wales. The Prince, he was told, had insisted that he not be awakened. "A nice chap!" Lautrec commented, and went back to sleep. He was not impressed by being introduced to Milan, the former King of Serbia: "After all, you're only an Obrénovich." He had the same ready smile, the same barbed wit for everyone from the stuffiest members of the Jockey Club to the pimps and whores with whom he rubbed shoulders nightly in the back streets of Montmartre. With his fellow artists and with the nightclub performers he might dress like an apache and speak the fashionable underworld argot which in his time

became a kind of parallel language for the French. When he went to dine with his mother, he wore natty evening clothes and he spoke the French of the Académie Française.

Lautrec kept his political opinions to himself and his religion was a duty he had learned as a child, the conventional Catholicism of the French nobility. When in his apprentice years in Paris his master picked him to collaborate on a big Biblical painting, his mother wrote home to Albi asking for a family Bible as it wasn't fitting for him to do his research in a Protestant version. When he lay dying, he asked for the priest who had been both chaplain at the Château du Bosc and family tutor.

The only thing he took seriously was art. "So cynical and foul-mouthed on all other occasions," said his friend Vuillard, "he became completely serious when art was mentioned." When he heard his friend Van Gogh being maligned by a Belgian painter at a banquet, he bounced up, waving his arms in the air, shouting that it was an outrage to criticize so great an artist and challenging the wretch to a duel which happily never took place.

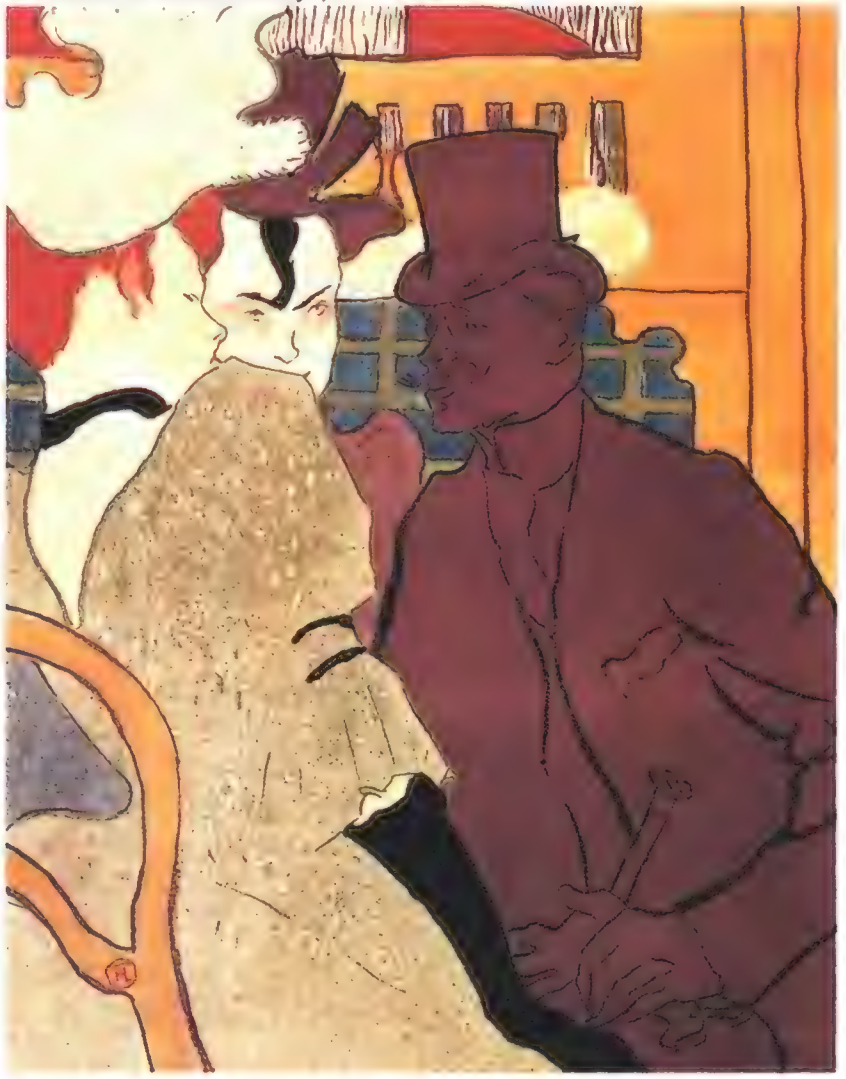
Art for Lautrec meant life, the life of the world around him. He never looked for subjects. "I aim for the true, not the ideal," he said. He had come through the agonies of his adolescence stripped of illusion; he kept his big nearsighted eyes fixed coldly, dispassionately, relentlessly, on what he saw around him.

The world he chose to see was naturally the one he felt at home in. It was, as he said, a double world. Half his time he was in the aristocratic world he had been born into, a life of elegant salons, racecourses, cruises, yachts. He always traveled first-class. He went home often to savor the life of the old-fashioned chateau, warm and easygoing, with all the servants who had brought him up running out to greet Monsieur Henri. The children loved him on these visits, he was their size—though he sat at the grownups' table, his legs dangling over his chair just like theirs—and he spoke their language. But they couldn't help noticing how his eyes kept turning to the bottle of absinthe which was always somewhere nearby.

The absinthe was everywhere in his other world, the seamy world of Montmartre, then still partly country with its vineyards and gardens and its strange fauna of criminals, prostitutes, vagabonds, artists and well-dressed slummers. He wrote piously to his grand-

Metropolitan Museum of Art, New York

Collection of Nelson Blitz jr., New York



Oil and gouache (left) and lithograph (above) of *The Englishman at the Moulin Rouge*, study of low life.

mother that he went there at first only out of a sense of duty to keep up with his fellow artists, but his dwarf's profile was soon a regular feature of the landscape. He was a familiar and welcome figure in all the cafés, the dance halls, the cabarets, the bars where he could keep drinking after the cabarets closed. Elsewhere he had said it pleased him, too, "to set up my tent in a brothel." There were any number of *maisons closes* in the neighborhood and Lautrec might move into one of them for months at a time, keeping a room to himself and using it as a temporary business address. He was Monsieur Henri, the painter, to these women, too; he took his meals with them and they cheerfully posed for him day or night. (Presumably it was during these years that he contracted the syphilis that was probably a contributing factor in his death.)

Unposed and unrehearsed, in the raw

Lautrec had no moral or political ax to grind. He drew and painted his prostitutes just as he saw them while living among them, women going about a job, lining up for medical inspection, waiting in bovine repose in the parlor under the madam's prim eye, waiting for the American millionaire or Russian grand duke who would give the signal for the orgy to begin. When Van Gogh painted a prostitute, he labeled the picture *Sorrow*. When Lautrec did the same, he simply called it by the girl's nickname, *Madame Poupoule*.

Whichever of his two worlds he was in, Lautrec had the same eagerness to seize upon the men and women (and animals) who populated it, to strip them down to their essentials with a few sure strokes, show them unposed and unrehearsed, in the raw. He wanted the spontaneity of a snapshot and he cropped his figures, had them come ballooning out of the picture frame in startling ways. There was nothing slapdash about it, however. His effects of spontaneity were carefully calculated and he may have done six or eight complete versions of a subject before it came out with the look he wanted.

He was capable of all kinds of technical tricks, but he was not particularly interested in the painstaking construction of three-dimensional spatial illusion. He saw things up close. He was primarily interested in character and drama and the presence of living flesh, and he deliberately left his backgrounds vague and even confused. If he put a landscape behind one of his figures, it was often little more than a jumble of colored strokes. He did more than 30 paintings of the Moulin Rouge, creating an unforgettable gallery of human forms among the performers and the spectators, but it would be hard to get more than a sketchy idea from them of what the Moulin Rouge itself looked like.

Private collection

Late work, *The Jockey*, is of subject dear to Lautrec. He was close to horses from early childhood days.

During the 1890s he worked out his distinctive style and it hardly varied till he began to go to pieces at the end. Influenced by Degas and even more by the Japanese prints which were then all the rage in Paris, the style depended on broad areas of solid color bound by an elaborate network of lines. This is a style admirably adapted for printing by lithography, in which each color is applied to the paper by a separate stone, and Lautrec, a hard worker and a superb technician, rapidly became a great innovator in this field—in the view of many, the greatest lithographer of all time. He had learned as a magazine illustrator the ways of getting a maximum of effect with a minimum of means. When, in 1891, the owners of the Moulin Rouge asked him to design a poster advertising the autumn season of the music hall, he knew just what to do.

The resulting poster (p. 72), which made him famous overnight, sums up all the possibilities of the medium. It is instantly legible, for posters are made so that he who runs may read; one look at La Goulue

Art Institute of Chicago

Moulin Rouge poster depicts sensational La Goulue, partner Valentin le Désossé doing their famous act.

kicking up her skirts and Valentin le Désossé, her dance partner (he was also a wine merchant), identifies the place forever. And it is so expertly designed at the same time that it can be studied at length and with pleasure. In fact, people began collecting Lautrec posters as soon as they began to go up on the walls of Paris. What had previously been only a commercial medium was now fine art, fit for entry into museums. Lautrec himself made no distinction between fine and commercial art; he worked with the same zeal and competence on theater programs, book covers, magazine illustrations, calling cards, menus, invitations (there is one showing the little artist dressed as a cowboy complete with spurs and a whip in his hand, standing before a very placid-looking cow and inviting his friends over for a glass of milk). He was a master of layout, blending text with eye-catching illustration, and advertising men have been in his debt ever since.

Lautrec himself was not given to esthetic theories. He went on painting what he saw around him, developing a passion, sometimes an obsession, for a single subject and then letting it drop abruptly. There are whole cycles of drawings, paintings and lithographs devoted to the circus, to the theater, to the singer Yvette Guilbert who at first liked them but whose friends thought he was making fun of her, to the operating room of the famous surgeon Dr. Péan (who was teaching Lautrec's "bony cousin" Gabriel Tapié de Céleyran, a young medical student who regularly accompanied the painter on his tours of the haunts of Montmartre at night).

All the while, he was more or less deliberately drinking himself to death. In 1898 he began to have convulsions and deliriums and had to be taken off to a clinic in Neuilly. The doctors were delighted to have a wealthy artist in their grip and might have kept him there indefinitely, but he was anxious to get out and stirred up his friends to demand his release. When he was sufficiently dried out, he asked a friend to send "prepared stones and a box of watercolors with sepia, paint brushes, litho crayons, good quality Chinese ink and paper," and to prove that his hand and mind were still in first-class shape, he drew from memory a whole series of circus scenes. The doctors let him go and for a while he listened to their advice and stayed sober. But not for long. His friends had once given him as a joke a hollow walking stick which they said was used by Belgian smugglers bringing untaxed absinthe into France. He could use it now when the cousin who was supposed to be guarding him looked away.

In 1901 he suffered a couple of strokes, and knew that it was hopeless. He neatly signed and stacked all the works in his studio and went off to Malromé to sit and doze in the garden with a bottle by his side and his mother faithfully watching over him. "It's awfully hard to die," he said as he waited, and took a long painful time doing it.

Count Alphonse turned up unexpectedly. "Ah, Papa," said Lautrec to the old huntsman, "I knew you'd be in at the death." The old man wrote a grief-stricken letter about the "inoffensive child" who had never spoken a bitter word to him. He sat decorously with the mourners till he heard a strange noise upstairs. When they said it was some owls who had got into the tower, he rushed out to hunt down the owls. At the funeral the next day, he climbed up beside the driver of the hearse to make sure that he held the reins properly and that his son "could go to his last resting place in a manner befitting a gentleman."

In a major work that does not appear in the show, Lautrec painted his "poor saintly mother."

Musée Toulouse-Lautrec, Albi, France

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We design cars.

By James R. Chiles

On land, at sea and in the air, those polymer invaders are here

Once a synonym for the cheap and shoddy, plastic has captured a new high-tech image—and has captured the marketplace to boot

For years now the stuff has been insidiously creeping into the nooks and crannies of our lives, firmly but unobtrusively shouldering aside the traditional materials of which our world is made. Cars are constructed of it, and boats and even airplanes, to say nothing of computer housings and camera bodies and fishing rods and watch cases and suitcases and cookware and roller skates and toothpaste tubes. It has replaced the glass in our spectacles, the paper in our grocery bags, the wood in our tennis rackets, the cotton in our clothing and, in an especially pernicious peanut-shaped form used for packing material, it has exploded from a million cardboard appliance cartons to lodge under our couches and drive us to intemperate language.

It can be brittle or brutishly strong, dirt cheap or astonishingly expensive, fragile or virtually indestructible. It can go anyplace from outer space to the depths of the sea, and once there it will do just about any job it is called upon to do. For decades, as a society we have denigrated it even as we have consumed more and more of it. If in our fanciful moments many of us imagine ourselves in a world free of it, in *fact* most of us would sorely miss its extraordinary versatility and usefulness. By now the stuff has—literally—found its way into our hearts.

The stuff is, of course, plastic.

Plastic has long been with us. Indeed, the amber that once trapped prehistoric flies is a natural form of plastic. Celluloid, a nearly natural plastic, was developed by John Wesley Hyatt in 1868 as a substitute for ivory in billiard balls. Unfortunately, their high flammability added a little too much excitement to the game. One player in a Colorado saloon set off a ball when he approached it with his cigar, causing every man in the room to draw his gun. After the turn of the century, synthetic plastics overcame this and other problems and became well known in the 1930s and particularly in the 1940s as a conspicuously heralded substitute for other materials. Since then—with far less fanfare—it has steadily increased its influence over our lives. In 1976, plastic outstripped steel to become the nation's most widely used material. Today we make and use more plastic than we do steel, aluminum and copper combined. Last year the U.S. plastics industry, the world's largest, produced more than 21 million metric tons of the stuff worth more than $18 billion.

This decade has seen the advent of what might be called superplastics—sophisticated materials custom-tailored to possess an almost infinite variety of properties, from strength to lightness to conductivity to slipperiness to inertness. Indeed, a plastic can be engineered to have almost any property you can name. More than 10,000 varieties of synthetic plastics are already on our shelves and—like it or not—many more lie in our future.

In a locked room on the fifth floor of the Smithsonian's National Museum of American History, among the industrial curiosities known as the reference col-

Freestyle rider Scott Freeman sits amid a plastic world. The wheel of his bike is glass-reinforced nylon. The airplane fuselage, satellite receiving dish and automobile body panels are all plastic composites, as are the tennis racket and fishing rod. The suitcase and the cases for the telephone, computer, radio/recorder and Scott's cassette player are pure plastic; so are the sandals. The kayak is a composite of plastic and Kevlar laminated with fiberglass. The Army and construction helmets are fabricated from a Kevlar-reinforced composite; the work gloves and the Army flak jacket are reinforced with Kevlar.

Photographs by Brian R. Wolff

Once out, plastic is definitely in

In this still, about five feet high, Leo Baekeland made the first synthetic plastics from 1907 to 1909.

lection, is a man-high iron contraption that looks like a cross between a baker's dough mixer and a diving bell (left). It is Leo Baekeland's first production "still" and inside it, in 1907, synthetic plastic was born.

Baekeland was a businessman-chemist. Born in Belgium in 1863, by age 21 he had his doctorate from the University of Ghent and soon after that a professorship. But after a trip to America, he resigned his post and immigrated here to try his skills in the marketplace. He invented a quick-developing photographic paper, manufactured it briefly as Velox, then sold the rights to Eastman Kodak in 1899. At age 36 he was rich enough to retire. He bought an estate on the Hudson River and installed a laboratory in a barnlike building near his house. There he started looking for something to replace shellac. Shellac was then needed for varnish and high-voltage electrical insulation, but the tiny lac insects of Asia which produced it could not keep up with the demand.

He jumped off from the knowledge that chemists of the previous century had often been annoyed by tough, insoluble resins left in their beakers after experiments. In his still, Baekeland blended phenol, formaldehyde and various catalysts under heat and pressure. The chemical reaction produced not shellac but something that would prove to have infinitely greater potential—an amber-colored material that was strong, fire resistant and chemically inert. He named the material Bakelite and got it into full-scale production in 1910, just in time to use it in distributor caps for the fledgling auto industry.

Baekeland did not understand precisely what he had wrought. Today we know that a plastic is a "polymer," meaning made of many parts. A polymer is composed of giant molecules, themselves made up of hundreds or thousands of once independent molecules linked in structures that are similar to, but also profoundly different from, what went into them. Chemists string smaller molecules together to form the giant polymers with heat, pressure and the addition of other chemicals. The elments making up these molecules are relatively few—usually carbon, hydrogen, oxygen, silicon, nitrogen, fluorine and chlorine—but they can be combined in an almost infinite variety of ways to produce such plastics as polyethylene, polystyrene, polypropylene, polyurethane, polyester and a host of other polysyllabic substances as well as such familiar materials as Teflon, nylon, vinyl and epoxy.

The basic raw materials for the manufacture of plastic are petroleum and natural gas, but plastic can also be made from coal or—if need be—even from

Reporting this story inspired the author to invent two gadgets made of plastic: a switch plate with hooks to hold keys, and an automatic plant waterer.

wood. These hydrocarbon materials are processed into a waxy, moldable—hence "plastic"—stuff called resin. We associate steel with labor-intensive mills in Pennsylvania and Ohio; resin originates in computer-controlled plants that cluster along the central Atlantic seaboard and the Gulf Coast. Resin plants look less like steel mills than like oil refineries, because—like the latter—they manage continuous chemical reactions.

The most common resin is polyethylene, of which the United States produced about seven million tons last year. Du Pont's polyethylene plant on the coastal plain near the Texas-Louisiana border is representative; it uses unearthly pressures rather than the white heat of a blast furnace. Up top, it has a spiky, Gothic look lent by a profusion of vent pipes and flare towers. But down below, huge green-painted compressors thunder in basso profundo, raising pressure a step at a time until "initiator" chemicals can start a reaction that transforms ethylene gas into the white plastic called low-density polyethylene.

Ethylene—flammable, colorless and odorless—is the most important single ingredient in making modern plastic. The Gulf Coast is webbed with pipelines transporting it from production plants, which make it from natural-gas liquids, to buyers. Besides polyethylene, the gas goes into vinyl (for pipes, records and car upholstery), synthetic fibers for clothes, and polystyrene.

From utopia to the discard pile

Polystyrene was an early synthetic used in many consumer products. Introduced in the 1930s, it came at a time when plastics seemed the key to a new utopian era. Popular magazines forecast a world remade: plastic houses, plastic planes and plastic cars. The perfection of injection-molding machinery brought the industry to a new high of mass production. Then plastics went to war and seemed more indispensable than ever. "When the Minuteman returns to his Plow—" one advertisement boasted, "it will have *Plastic* handles." But as the economy changed gears after the war, plastic's popularity plunged. "Plastics," wrote a Chicago reporter in 1946, "the wartime material for clocks, compacts, and junk jewelry, has virtually gone into the discard."

"The reason was that everybody was manufacturing items of low quality, like junk toys," said Albert Spaak, president of the Plastics Pioneers of America. "We had just a few materials to work with, and polystyrene was really brittle."

Poorly-made vinyl goods also caused a public-relations crisis after the war. John Keville of the National Plastics Museum, under construction in Leominster, Massachusetts, remembers women's handbags that stuck to painted or varnished surfaces. Some vinyl shower curtains were "not even fit to hang in a stable," said a manufacturer at a 1947 trade show. "They smell, they sweat, the print comes off and they get brittle." The problem, explained Keville, was a shortage of the proper raw materials. Plastics also took abuse for breeding sterile, anonymous design, often because of the economics of a molding process that demanded many thousands of identical items designed to offend the fewest people. And besides, after putting up with long war years of synthetic substitutes for materials like metal and leather, people wanted the real thing back again.

The reputation of plastic as an inferior substitute "has never really disappeared," says the National Plastics Museum's Keville.

The newest rage in Swiss watches, these even use plastic rivets. They weigh less than an ounce.

Once out, plastic is definitely in

B. Jean Jones smooths adhesive that will hold plastic composite in a wing part for the F/A-18 jet fighter.

Quite so. Consider polyester. A genuine miracle fabric made of plastic fibers, it is durable, easily washable, wrinkle resistant and, in some current formulations, almost indistinguishable from wool or silk. It is used in expensive dresses and designer gowns, and yet it has never outlived its reputation as bargain-basement garb for the proletariat.

Back in 1967, when Dustin Hoffman played the role of young Ben in the film *The Graduate*, a friend of his parents offered some avuncular advice at a party: "Ben, I want to say one word to you, just *one* word . . . Ben, are you listening?" "Yessir," mumbles Ben. "Plastics!" the man declares.

Even if the scene was intended as irony—fresh out of college, Ben was hardly dreaming of a career in, say, ticky tacky—he might have been well advised to pay attention. For as John Keville points out—and the most casual look around the American marketplace would tend to confirm him—the public image of plastic is changing. Part of that change has to do with materials known collectively as "engineering resins"—defined as those capable of replacing metals.

The high-tech aura of ABS

Take a heavy-duty electric drill, raise it head-high, and drop it onto concrete so that the plastic part of the case strikes first. Or shove a portable computer off a table. The reason that their housings don't dent or break is an engineering resin.

One such engineering plastic common in housings for electric tools, portable typewriters and video cameras is an alloy called ABS, which abbreviates "acrylonitrile-butadiene-styrene." If you wear a plastic-bodied watch, it's probably made of ABS (p. 79). The body parts are injection-molded, which means that granulated ABS is melted and forced by a ram under high pressure into a cooled steel mold. The most common case color is black, but Armond Vallieres, an engineer for Timex Corporation, explained that raw ABS is amber in color and takes other colors easily. "People want black because it goes with a lot of clothing," he said. Matte black ABS also has an aura of high-tech chic—these days some ABS watches look as if they belong in the dashboard of a sports car or the cockpit of a jet fighter.

Many plastics are not especially strong by themselves, but combined with reinforcing fibers made of "graphite," they become incredibly muscular. The fine black fibers "are really not graphite," corrected Craig Robinson, research and development manager for Prince Manufacturing, a maker of tennis rackets. "They're carbon." Ounce for ounce, carbon fibers are much stiffer and stronger than steel, aluminum or titanium. Carbon-epoxy enables *Voyager*—a plastic air-

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A PET plastic blank is about to be enclosed by the two halves of a mold and blown up into a soda bottle.

Green soda bottles, their base cups already glued on, will next run through labeling machinery at rear.

plane designed to go around the world without refueling—to carry five pounds of fuel and cargo for every pound of plane (SMITHSONIAN, February 1985).

Aerospace companies used carbon-fiber reinforcing first, but sporting-goods manufacturers weren't far behind. It goes into golf clubs, bicycles, ski poles and tennis rackets, often in combination with glass fibers.

Carbon-reinforced sports equipment, very expensive a decade ago, is still not cheap—a carbon-shafted golf club can cost $190, a tennis racket $90 and up. David Lumley, a marketing director at Wilson Sporting Goods, guesses that carbon-reinforced rackets now account for 80 percent of sales nationwide. Wilson has stopped making wooden rackets entirely. It still makes aluminum rackets, though it has found that customers now prefer them painted high-tech black—an interesting example of a metal imitating a plastic to enhance sales appeal.

A West Coast company called Fenwick/Woodstream was the first to adapt the technology to fishing. Carbon, engineering director Vic Cutter said, makes a "fly rod that will dampen vibrations much more quickly [than fiberglass] due to the stiffness and lightness of the fiber." The advantage of a rod that is quick to dampen its own vibration is that it will shoot a line out farther and more accurately. Graphite rods now dominate the top of the market.

An Army helmet introduced in 1982 combines a different reinforcing fiber with a plastic alloy called phenolic-polyvinyl-butyral. Troops sometimes call it "the Kevlar," in honor of the Du Pont fiber responsible for absorbing impact shock. The new model weighs the same as the M-1 steel pot it replaces, but it's about a third more effective at stopping shell fragments. Sixteen plies of Kevlar theoretically are not tough enough to stop bullets, but do on occasion. "I'm pretty impressed with it," said Staff Sgt. Charles Lalone of the 82nd Airborne—as well he might be. During the invasion of Grenada his helmet took two glancing hits from a Russian-made rifle—but Lalone survived. (Since the 1981 assassination attempt by John Hinckley, President Reagan is reported to have worn a Kevlar vest on public occasions.)

Kevlar doesn't work for everything. Of a prototype shark-resistant suit, one Du Pont salesman said: "The problem is that a shark can gum you to death." But the

The Mitey Barons with their manager, Ken Flaherty, Suncor Public Affairs Coordinator. Ft. McMurray, Canada.

SUN, ENERGY AND THE MITEY BARONS. Twenty years ago Ft. McMurray, Canada, wasn't the town it is today. In fact, it was barely a town at all. That was before Sun Company developed a process to extract oil from the surrounding tar sands. And Sun people like Ken Flaherty can tell you what's developed since then.

"There was a time when this place was mostly tar sands and virtually undeveloped. But Sun brought a lot of energy to Ft. McMurray. We're getting more than fifty thousand barrels of oil a day from these sands. And under the snow around here there's more oil than in Saudi Arabia.

"We've got jobs, a community, and some pretty decent hockey teams. The energy's not just under the snow. It's everywhere."

At Sun we think putting our energy back into a community is just as important as getting it out.

WHERE THERE'S SUN THERE'S ENERGY.

Samples of plastic and other materials undergo accelerated weathering tests in New River, Arizona.

Mirrors on test mounts focus sunlight so that samples weather 8.5 times faster than in normal conditions.

company is enthusiastic about Kevlar in work gloves, clothes for smokejumpers and civilian hardhats.

The first all-plastic-bodied car was a cream-colored Ford that went on display in August 1941. The phenolic in the fenders was mixed with Southern pine, straw, hemp and a fiber called ramie that the Egyptians once used for mummy wrapping. Henry Ford impressed people by walloping the sides with a fire ax; the fenders bounced back. Ford promised to start producing plastic cars after the war.

It didn't happen. Among the reasons: plastic parts took more time to manufacture than steel ones and they were more difficult to fit to the chassis. In 1953, Chevrolet introduced the Corvette, made of plastic-bonded fiberglass. But the Corvette was and is an expensive, limited-production car whose body panels require extensive hand fitting to the frame. It was not until 1984 that the first high-volume, plastic-bodied car appeared, the Pontiac Fiero (p. 76). The Fiero factory in Pontiac, Michigan, uses a computerized machine to solve the fitting problem by measuring each steel frame, shaping its mounting surfaces and drilling holes in the right spots.

The Fiero's frame is still metal, and the Fiero isn't much lighter than a comparable all-steel version (calculations showed weight savings of zero to 30 pounds) but it has some significant pluses. Lou Wassel, marketing manager of sporty cars for General Motors, said he's suspended a bowling ball from a chain and swung it through a two-foot arc against a Fiero panel. "I've seen people stand on a panel and I've seen people kick them: none of those things left a dent." Scratched panels can be patched and painted, but when heavily damaged, GM recommends replacement.

For consumers, plastic's biggest advantages over steel are probably its greater resistance to corrosion and dents. Said Louis Collier, an automotive products manager for Du Pont, "Right now, the [metal] body ages the car. Plastics will change that: it will last essentially forever."

Painting the Fiero requires plastics that can tolerate paint-drying ovens. This high-temperature technology has spilled into the kitchen. Most of the new plastic ovenware is a glass-reinforced polyester similar to that on the Fiero and Corvette. Polyester is competing with ceramic and glass dishes for space in your microwave oven, where metal cannot be used. It's even crowding aluminum and steel in your conventional oven, because these polyester pans are rated up to 400 degrees F.

Threatening glass from another direction is the plastic bottle made of PET, short for polyethylene terephthalate. After just eight years on the market, six

billion bottles are produced worldwide each year.

Last year PET had a smaller piece of the soda market than either glass or aluminum, but it was growing while glass was dropping and aluminum holding steady. And the market isn't limited to fizzy drinks. Heinz has found that plastic bottles for its ketchup weigh only a tenth as much as glass bottles. Bartenders like PET whiskey bottles because they don't break on the floor and drinks come out faster from squeezable containers. A jumbo jet can save $25,000 in fuel costs every year if it flies with single-serving liquor in PET rather than glass, because each PET bottle is about one-third of an ounce lighter.

Another breakthrough in packaging results from a process called "barrier coextrusion," in which plastics with different properties are layered into a single sheet. One layer provides overall strength, another prevents punctures, another protects flavor, still another blocks the passage of small molecules. The most common item in your home using barrier coextrusion is the toothpaste tube, which may contain as many as nine different layers of plastic.

Nowadays plastics have moved into every room in the house in the form of countertops, plumbing, paints and vinyl floors, and have covered the outside as well with vinyl siding. But what about the house itself? We were promised plastic houses more than 40 years ago, but conventional materials proved very tough to beat. Monsanto Chemical Company and a group of cosponsors built a plastic house at Disneyland in 1957, near the entrance to Tomorrowland. The walls, roof,floors, rugs and furniture of the "House of the Future" were all plastic. Crews demolished it ten years later (with some difficulty, a Disney spokesman said, because wrecking balls just bounced off) to make room for a souvenir stand. Nearly 30 years later, that design, or any other plastic house for that matter, has yet to find a place in American suburbs. Even if a plastic house were practical, few people would want to incur the wrath of their neighbors by erecting one on the street.

Plastic is used in some nonresidential structures where metal won't do, such as highly corrosive environments or electromagnetic-testing facilities. One of Apple Computer's test labs is a building made totally of plastic, down to the nuts and bolts (p. 86).

The impact of the plastic revolution on industry has, of course, been enormous. Owens-Illinois, the country's largest producer of glass containers, has recently closed four of its glass plants. But it has also adopted the philosophy that if you can't fight 'em, join 'em—it is now making plastic soda bottles—and other industries are following suit. Reynolds Aluminum now sells plastic wrap for your kitchen. Glassmaker PPG also spins fiberglass for plastic reinforcement. The Budd Company, a subsidiary of a West German steel company, makes plastic panels for the Pontiac

Pellets of Du Pont's Delrin, an engineering resin, will be melted by manufacturer for injection molding.

This plastic building is used by Apple Computer to test their machines for electromagnetic emissions.

Fiero, and U.S. Steel produces plastics through its U.S.S. Chemicals division.

Environmentally, plastics have a good deal to recommend them. Plastic requires only one-tenth of the energy required to produce aluminum, and in spite of the enormous volume involved, plastic accounts for only five percent of our petroleum consumption. But plastics also present some special problems. Although the basic resin-manufacturing process presents a much cleaner face than a steel mill (there is little smoke and soot), it is also true that many of the ingredients are dangerous. Benzene, for example, which goes into the manufacture of styrene, epoxy, polyester and nylon, is a carcinogen. Common types of plastic produce toxic gases in fires, including hydrogen cyanide and hydrogen chloride. The plastics industry counterargues that natural materials such as wood also produce toxic gases when burned, and that nonplastics may be more prone to catching fire or starting fires (as in the case of metal electrical housings). Carbon-reinforced plastics create a particular problem—when burned, they release clouds of tiny fibers that can get into electrical equipment and cause short circuits.

One concern of environmentalists is that many plastics—such as PET bottles—are neither biodegradable nor easily recyclable, and that the material is increasing our already staggering solid-waste and litter problem. Recycling plastic bottles does not have the economic incentive that recycling aluminum cans or even glass does, but manufacturers are working to make it more practical.

For all that, there is little question that there will be more and more plastic in our future. In 1963, industry consultant Gerald Shook predicted the role of plastics in the year 2000. "Most of my projections," he recalls now, "came to pass in about six years."

A plastic automobile *engine* is already a reality. The Polimotor, 200 pounds lighter than its metal counterparts and plastic right down to its block and connecting rods, started running on the racing circuit last year, and such an engine could power luxury cars in the near future. Mass-produced plastic automobile frames are a gleam in the eye of Du Pont, which is also working on a material called Bexloy C that it hopes will replace exterior sheet metal on most cars after 1995. It would, Du Pont claims, cut the cost of producing exterior parts by 20 percent. Volkswagen is working on a plastic fuel tank, and plastic drive shafts are already a reality. Cars are just the beginning. Under development are "aseptic" polymer packages that can hold milk or other perishable products for 18 months or more without refrigeration. A space shuttle to be launched next year will ride on a solid-fuel booster made of graphite epoxy that is 40 percent lighter than the current steel models. As medical scientists gain more control over the interaction between plastics and living tissues, we can expect to see tiny synthetic blood vessels and a variety of bodily organs. The Jarvik 7 artificial heart is mostly plastic, and the University of Utah is already at work on a plastic pancreas. Recent development of electrically-conductive plastics raises the prospect of flexible sheets of photovoltaic cells and transparent speakers that you can hang on your wall or over your television screen.

In spite of past experience, visionary plastics enthusiasts like John Keville of the Plastics Museum argue that plastic houses will be commonplace 20 to 30 years from now, and, if costs drop, even plastic bridges and domes to cover whole towns could follow.

And so, regardless of how we feel about it, we might as well prepare ourselves. Leo Baekeland's genie has been out of the bottle for almost 80 years now; no one is going to put it back in.

Polyethylene pellets are melted in this extruder, blown into a bubble to make industrial bags and sheeting.

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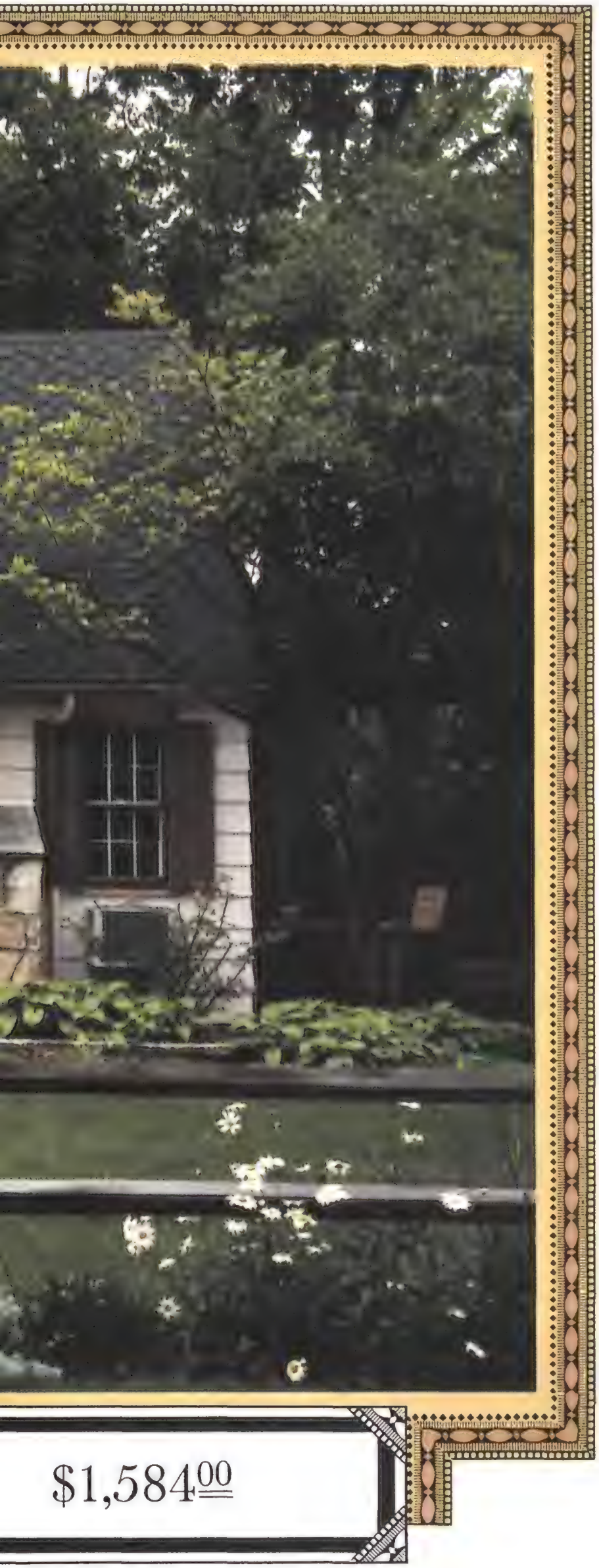


By David M. Schwartz

When home sweet home was just a mailbox away

Hot items in Sears catalogs from 1908 to 1937, these 'Honor Bilt' houses are now the darlings of owners, preservationists

An element of perplexity mingled with the obvious sincerity in Linda Pruitt's voice. "If you come out here, we'll be delighted to talk with you, but please be aware that these are very modest Midwestern homes." The sentence was punctuated with pauses after "very" and "modest," providing an emphasis that was gently but clearly communicated over the telephone.

Carlinville is an average sort of Midwestern town, a graph-paper grid of shaded streets and well-tended buildings that crop up out of the cornfields lining Interstate 55 in west-central Illinois. In the 19th century, its greatest architectural furor was caused by wild cost overruns on the Greek Revival "Million Dollar Courthouse" of 1870 that nearly brought on a civil war among Macoupin County's enraged citizens. Now, in 1985, 152 frame dwellings in a 12-block area known as the "Standard Addition" are stirring up a lot more excitement among preservationists than their unimposing looks would suggest.

I had been undeterred by Linda Pruitt's warning. Modest the houses may be, but they also have an odd distinction: they were ordered from Sears, Roebuck and Co. A mail-order neighborhood, if you will.

To those who have known about it all along, the origin of the homes was never especially remarkable.

If you'd responded to a Sears ad something like this back in 1935, here's the house you'd have today.

Photographs by Gail Mooney

In 1918, 156 Sears homes went up in Carlinville, Illinois; today's residents voice their approval.

Houses in its Standard Addition may be "modest," as one owner says, but they are meticulously maintained.

In the early years of this century it was discovered that the entire town sat on a seven-foot seam of coal. Seeking fuel for its refineries, Standard Oil of Indiana opened the Berry Mine in 1917. Six hundred miners were employed and Carlinville was transformed virtually overnight from farm town to boom town, long on power and promise but short on adequate housing. To meet the need, Standard Oil placed a $1 million order early the next year with the company that pitched itself as "The Biggest Home Building Organization on Earth."

"These are fine houses—traditional, well-constructed, solid as the Rock of Gibraltar," explained Jayne Bowman as a small group of us ambled down North Charles Street, noting the stylistic distinctions between the various models, "but really they're nothing more than your basic Midwestern box." In the Sears catalog each had a name like The Warrenton, The Whitehall, The Gladstone and The Carlin (presumably named for Carlinville). There are at least eight models, varying in roofline, porch location, window type and other details, the diversity providing a variegated streetscape that belies the fact that all of them were ordered, en masse, out of a catalog just bursting with options.

"It used to be that when people talked about the 'Standard Addition,' " explained Melody Tigo, "we knew that in their heads they were thinking, 'Substandard Addition.' But now we've got status. All of a sudden, we're on the right side of the tracks! Your home, wherever it is, ought to be kept up, but now a lot of us are beginning to feel, 'Hey, we really *got* something here. *Our* house is as important as the one where Abe Lincoln stopped when he visited Carlinville.' It's just a little old house. I love it, but it's just a little old house."

In 1981, *Historic Preservation* published an article on Sears houses; a year later the Associated Press put out an item. When local editors printed it and included a box asking readers to write if they knew of Sears homes in their area, the response was overwhelming. The rush to rediscover mail-order houses was on.

If the idea of Sears, Roebuck selling houses seems outrageous, it seemed logical enough in 1908. The company was formed in 1886 by Richard Sears, a railroad agent turned watch salesman, and Alvah Roebuck, his repairman. Roebuck sold out in 1895, but

Enclosing porches gave owner of house on left a larger living room, his neighbor to right a music room-den.

Sears went on to achieve vast wealth by offering Americans a "wish book" of goods that could see them from birth to death. Baby buggies to tombstones, violins to wedding gowns, bust developers to patent medicines, the Sears, Roebuck catalog had them all.

Sears stirred his public with a silver-tongued promise of quality he called "the best in the world." He also offered—and made good—a rock-ribbed money-back guarantee. Americans devoured the Sears catalog as if it were literature.

A natural progression led in 1908 to the housing business. By the turn of the century, the Sears catalog had a sizable section devoted to doors, windows, moldings and other building materials. What better way to spur sales of items for the home than to sell the home itself? The first offering of complete "Modern Homes" appeared in the general catalog for Spring 1908; later that year, the company also issued its first Modern Homes Catalog, featuring 22 models ranging from $650 for a three-room cottage to $2,500 for a 9-room Queen Anne-style edifice. (In Cabin John, Maryland, a suburb of Washington, D.C., a little four-room Sears bungalow changed hands recently for $95,000, while the 1928 Hathaway, with an original kit price of $1,807, sold for $106,000.)

Copywriters left little room for doubt. "Let us save you from $500 to $1,000 or more on your next building," blared the bold print. "Don't let any contracts, don't make any arrangements, don't give an architect an order for any plans until you have carefully considered the wonderful offers we make you in this book."

Select, order—and wait for the boxcars

It was the American dream by mail order, and it couldn't have been much simpler. You picked your house, placed your order and waited for the boxcars to arrive. Sears offered nearly everything you needed —lumber, shingles, roofing, millwork, flooring, plaster, lath, doors, windows, fixtures—even sash weights and paints. (Plumbing, heating, wiring and the kitchen sink were extras.) Most vital, the shipment included a complete set of blueprints prepared by Sears' staff of architects. You provided masonry, labor and a building lot within hauling distance of a railroad siding.

Although most purchasers hired out the actual construction, many chose to build the homes themselves. Sears anticipated their every need and included with each order a 76-page instruction manual. Every board, every stud, every rafter, joist and molding had been cut, notched or mitered to fit, and numbered to match the plans. All the novice builder had to do was follow the numbers and put it all together, and the manual told him just how to do that—right down to the spacing between nails.

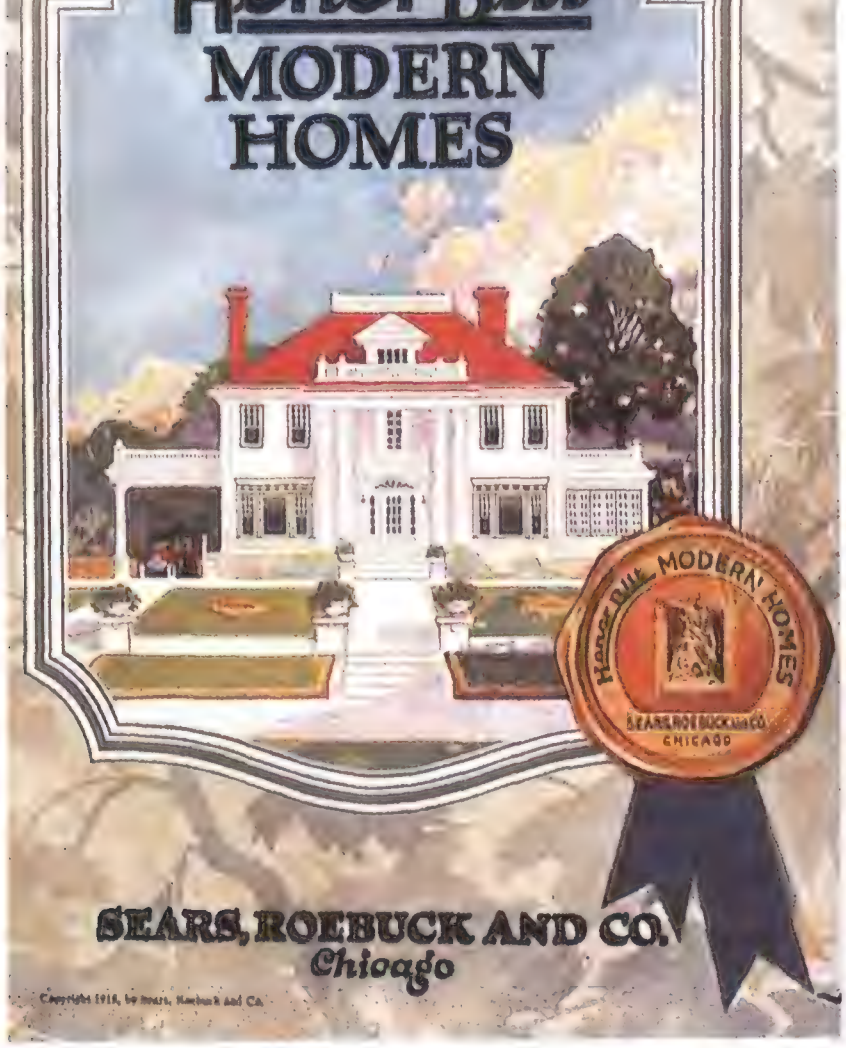
In the late teens and '20s, the Modern Homes program hit its stride, offering not only the materials needed to build a home but the money needed to finance it, as well. Sears, Roebuck and Co. was said to be the only institution to grant mortgages without meeting the borrowers or inspecting their property. Frequently the company advanced part of the cash needed to pay for local labor. It was an overly lenient policy that would later come back to haunt the lender, but not before more than 100,000 houses were sold.

Although Carlinville has the most extensive neighborhood ordered from Sears (Standard Oil's million-dollar check was reported to be the largest the giant mail-order company had ever received), there are other pockets of "Honor Bilt" homes around the country. Like the Standard Addition, the buildings were sometimes put up by an employer seeking housing for its workers; Hellertown, Pennsylvania, has 61 Sears homes originally occupied by Bethlehem Steel em-

After canvassing ten states in the pursuit of Sears houses, the author is having second thoughts about that Vermont bungalow where he once lived.

Top-of-the-line Magnolia was a ten-room mansion when introduced in 1918 with a kit price of $5,140.

In Ridgewood area of Canton, Ohio, the lot, extras and construction boosted cost of this one to $18,000.



Sears proudly displayed Magnolia on cover of its 1918 catalog, first one in which houses were given names.

ployees. Often local contractors, smitten with the labor-saving benefits of Sears' ready-to-assemble homes, would promote them in their own towns. Oscar and Elmer Blume of Des Plaines, Illinois, claimed 104.

The 146-page 1918 Modern Homes catalog was the first to bestow names on its houses; on the four-color cover was the top-of-the-line Magnolia (left), a ten-room Southern-style mansion with fluted Corinthian columns, curving black-walnut banister, leaded-glass buffet, a solarium and servants' quarters. Of course, you had to pay for such luxuries; the catalog price was $5,140. In the fall of 1926, to dramatize "Our Liberal Easy Payment Plan," a chart showed what the typical customer had probably spent in rent over the past ten years, abetted by a picture of a man dropping his rent money into a garbage can.

For Carl Puffe of Meriden, Connecticut, the 1925 catalog worked exactly as Sears intended. He was browsing through, "not looking for anything in particular," when his eye was caught by The Vallonia, a neat-looking cottage with broad eaves, a prominent porch and large three-bay dormer. The price, including electric wiring, sheet plaster and a number of other options he selected: $2,803.21. Puffe had "never built even a doghouse," but with the help of an equally inexperienced brother, he decided to give it a try.

The main problem turned out to be figuring out what to do with the house *before* it was together. Although Sears shipped materials in installments, Puffe

got behind schedule. Like a scene from the *Sorcerer's Apprentice*, supplies arrived faster than he could use them. "It's a good thing my mother lived next door," he says. "We shoved windows in her closets, doors under the beds, plaster, paint and everything else wherever we could."

When the Puffe brothers drove the last nail, two years after the first, Carl Puffe celebrated by betrothing May Lloyd in the living room. "She wouldn't marry me until the house was done!" the octogenarian recalls, a twinkle still dancing in his eyes.

Since the Modern Homes sales pitch stressed low cost, the company also took pains to emphasize it was not false economy. "We guarantee to furnish absolutely the most dependable grades of building material on the market." The catalog's pages were sprinkled with testimonials from overjoyed purchasers and builders. "I put up a house for Mr. James M. Ferguson," declared Henry V. Tillotson of Ossining, New York. "We have offered a reward of one dollar for every knot as large as a 10-cent piece found on this house, but no one has asked for a dollar. . . ."

"Quality? Let's have a look." Floyd Johnson kicked open a hatch that led to the crawl space beneath the front porch of his 1921 Americus, a hip-roofed Colonial in the smart-looking Chicago suburb of Glen Ellyn. Johnson knew nothing of his house's origins when he and his wife, Bev, bought it in 1967, but later, while exploring the attic, he found a set of blueprints displaying the Sears imprint.

On hands and knees, I stared up at the infrastructure of the Johnsons' porch: arrow-straight two-by-eight joists spaced 16 inches apart. If I'd relied on Henry Tillotson's offer to hand me a dollar for every knot bigger than a dime, I'd have gone broke.

Protecting the architectural integrity

Johnson showed me the blueprints, now framed and matted on the living-room wall. On each sheet a Bill of Materials enumerated every piece of wood in the house and gave its grade: floors were of clear maple, oak and pine, and framing lumber was all listed as "No. 1 Y.P." —top-grade yellow pine. I thought about the price of such lumber today—if it could be found at all.

After the grand tour, we sat among scheffleras and potted bamboos in a solar-heated addition Johnson had built on the south side of the house. The room's centerpiece was a six-foot hot tub occupied by the Johnsons' two sons. "When I found out it was a Sears house, I knew I wanted to protect the integrity of the facade," Floyd explained, "but my architectural idealism was challenged." Indeed, the sun room (p. 96), with its 20-foot expanse of glass on the south, was straight out of the '80s, but from the street, the entire

Corinthian capitals, fluted columns of yellow poplar support Magnolia's balcony, define graceful entrance.

Fine woods include black-walnut banister, birch treads and oak floor, hand-refinished by the owner.

room looked like a chip off the old house. "Don't think for a minute it was fun building this thing with a hip roof. It must have added at least a month to the job."

Five years ago Clyde and Sharon Reynolds bought a neglected 1913 Modern Home #132 in Lincoln, Illinois (p. 101). The kit price had been $2,000, at a time when the average production worker's salary was $520 a year. They set about restoring it, and the quest for authenticity has dictated every move. After sanding off textured paint, replacing a broken stained-glass window in the original pattern, refinishing floors, stenciling walls with water-based paint ("Acrylic is too bold to be authentic") and routing cracked varnish out of the dentil molding beneath the mantel with paint remover and a toothbrush, they're ready to move their operation upstairs. "We started with a five-year plan," says Sharon, "and now we've upped it to seven. I often doubt whether it's worth the work, but when people walk in with "oohs" and "ahs," I know it was."

For the Reynoldses, who have met daughters of the original owner and questioned them at length about the house's appearance during their childhood, the building's origin makes it special. "There are millions of old homes, but only 100,000 were made by Sears," Clyde says. "That makes it a limited edition, a classic—like a classic car." And a classic it is. The Reynoldses paid $65,000 for it in 1980, along with three acres of prime farmland. But local contractor Bob Albert estimates that, using custom materials the equivalent of those sent out by Sears in 1913, you're talking about $148,000 to duplicate the house today.

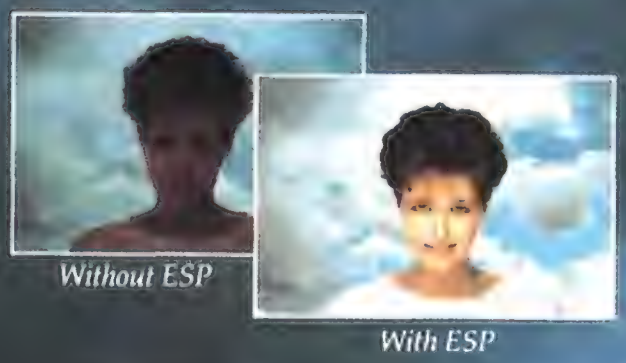
In addition to the Honor Bilt line, and the no-frills Standard Bilt homes, Sears did construct some truly limited editions—one-of-a-kind designs prepared by the company architects and put up by a Construction Division that was instituted in 1929. Among these were a replica of Mount Vernon erected at the 1931 Paris World's Fair, a mansion for the Florsheim family in Highland Park, Illinois, and an entire cultural institution, Music Mountain, in the Connecticut Berkshires.

Designed in 1930 by founder Jacques Gordon, former concertmaster of the Chicago Symphony, in conjunction with Sears' architects, Music Mountain has as its centerpiece a concert hall engineered as the archi-

Bev and Floyd Johnson found blueprints of their 1921 Americus in attic, added the sun room with hot tub.

Reynoldses restored 1913 oak cabinet, woodwork with elbow grease; on table, "before and after" album.

Olympus invents ESP for cameras.



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Erskine Hogue's father had house shipped to Oklahoma in 1913. Oak buffet and tulip art glass were extras.

Goetz sisters' father put up Sears barn in Groveland, Illinois, in 1927. Cost including labor was $1,943.

tectural analog of a violin: stained knotty-pine walls and maple floor cushioned by air spaces; French doors positioned to function like f-holes; ceiling beams of pine that act as a violin's base bar and sound post and carry vibrations throughout the structure. According to Nicholas Gordon, son of the founder, the result is "as if you had a fifth instrument in a string quartet and that fifth instrument is the hall itself." Musicians often tell him that Music Mountain has one of the nation's three or four best chamber-music halls.

Although Music Mountain weathered the Depression, the Modern Homes program did not. The nationwide market for new housing took a nose dive, and Sears found itself spending more and more for a slow-growing slice of a fast-shrinking pie. Keeping the Modern Homes program aloft required the aptly-described "Liberal Payment Plan," and ultimately that did it in. During the dark years of the Depression, the company found itself foreclosing on thousands of delinquent mortgages. In terms of public relations, it was a disaster—Sears, "the farmer's friend," repossessing hard-earned, hard-sold homes around the country. But in terms of cold figures it was even worse: between 1909 and 1934, home sales of about $90 million had returned a profit of $4.3 million. On the other hand, mortgage losses were nearly $7 million.

The Modern Homes department was dissolved in 1937, although leftover stock was sold into the '40s. Disposing of the homes was an expedient solution to a program whose time had passed, but disposing of all the records was an act that many homeowners have come to rue. Unlike the Johnsons and the Reynoldses, most of those who own the 100,000 homes have not found blueprints or former occupants to confirm that theirs are Sears stock. At that point the trail leads to the 40th floor of the Sears Tower in Chicago.

"Some owners would like some kind of certificate suitable for framing," Lenore Swoiskin, the company archivist, told me with a bemused chuckle as we thumbed through hundreds of letters from Sears house owners and would-be owners. "Sears can't tell you that you've got a Sears house. *You've* got to tell *us*."

It isn't easy. Since, for the most part, Sears architects copied popular styles of the day, the houses are not stylistically distinctive. Neighborhood rumors that a house came by mail don't help much either; although Sears was the largest purveyor of ready-cut kit homes, there were a few other companies in the business, including Montgomery Ward and, notably, Aladdin Readi-Cut Homes of Bay City, Michigan, which started first—in 1906, including a complete line of fixtures and home furnishings—and lasted longest, until 1983.

Still, for those who send a snapshot and a floor plan with their "We think we've got one!" letter, the archive staff scrutinizes old Modern Homes catalogs for a match, attempting as best they can to see through obscuring shrubbery, new-fashioned siding, enclosed porches and raised roofs. Their workload will be lightened next March when the National Trust for Historic Preservation in Washington publishes *Houses by Mail*,

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Gilt Wall Sconce by William Kent, c. 1730. Knole, Kent. The National Trust.

November 1985—March 1986
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WASHINGTON

This exhibition was made possible by a grant from
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an illustrated field guide to 375 of the Sears homes.

Organized by roof type and number of stories, the book will work like a bird or wild-flower guide, drawing the reader's attention to easily observed "field marks." Each page will name and illustrate one house and floor plan, describe its distinguishing features and, to make readers weep, state its original catalog price.

Co-author Katherine Cole Stevenson believes the book will do more than verify (or refute) the hunches of genuine or would-be Sears-house owners. Conceivably, it would help the former restore lost features. Most important, she hopes it will help preservationists to identify architecturally significant neighborhoods.

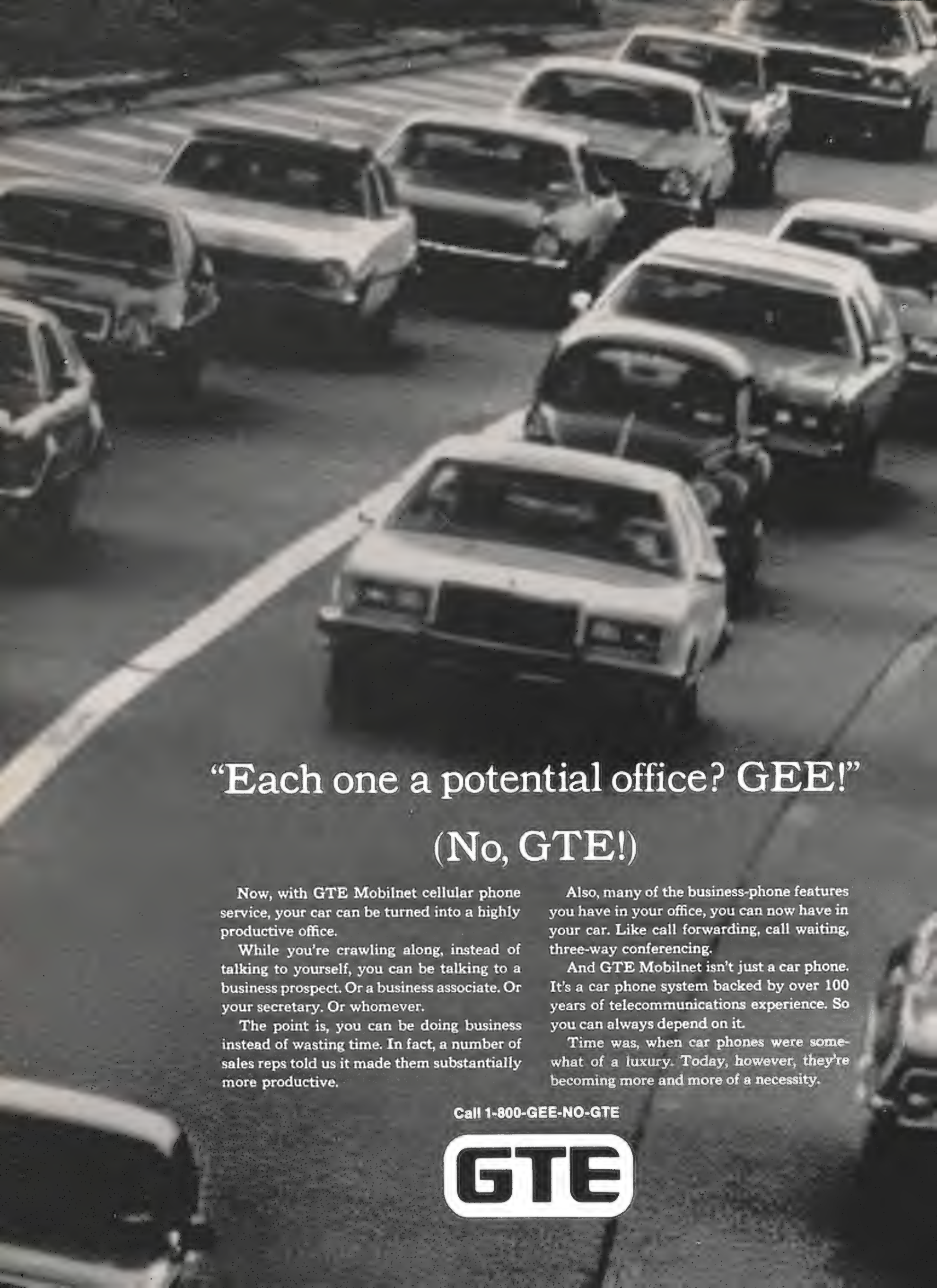
Diane Maddex, editor of the National Trust's Preservation Press, says prepublication interest in *Houses by Mail* has been extraordinary. "The simple fact that Sears sold houses in the first place, and the oddity of their having come ready-cut by rail, is fascinating. Then when you see the wide variety of these house styles, and how well they all seem to have been built, it's really surprising."

Surprising, yes. Fascinating, certainly. But in several months of tracking down Sears houses and speaking with their owners past and present, I've been hard-pressed to explain all the hoopla. For the most part, as Linda Pruitt told me in Carlinville, "They're just houses!" Big or small, plain or fancy, none is unique. They're solid, but so were houses designed and built at the same time by local talent. Sometimes they conjure up an appreciation for history, but why shouldn't any older home? Certainly they're dear to their owners. But as for architectural significance, Ward Jandl, preservation specialist with the National Park Service and co-author of *Houses by Mail*, believes the distinction of being a mail-order home is offset by the fact that there are probably several hundred others just like it. "In terms of special status like inclusion in the National Register of Historic Places, the two factors probably cancel each other out."

Just the same, I've been thinking a lot lately about that Craftsman-style bungalow I lived in a few years ago in Vermont—the one with the big dormer over the scooped-in porch. I could swear it's the spitting image of the house I saw on page 82 of the 1925 Modern Homes catalog. And I seem to remember hearing that it was a kit house, although I was hardly paying attention at the time. As soon as I get my hands on *Houses by Mail*, I'm going to head up to Vermont to check it out. On the other hand, maybe I won't. If I can't find that old house in the book, it just might ruin my day.

Hogue house is listed in National Register of Historic Places. The attic "Priscilla window" is original.

Lovingly restored by Clyde and Sharon Reynolds, this house, $2,000 in 1913, would cost $148,000 today.



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Article and photographs by Fred Bavendam

Sea stars deploy a bag of tricks in marine wars

Simple they may be, but these invertebrates have some special ways of eating their victims and avoiding being eaten themselves

In this sequence, a leather sea star stalks swimming anemone. In center picture, anemone fights back by trying to sting its attacker. When stings have no effect, the anemone wriggles loose and flees (opposite).

To the casual beachcomber, a sea star (what most of us call a starfish) appears nearly inanimate. Lying still in a tide pool, left clinging to a rock or stranded in beach wrack by a receding tide, this motif of seashore life looks nothing like the voracious predator that it often is. Yet as a group, sea stars are the scourge of their fellow invertebrates and in places compete with humans for clams, mussels, oysters and scallops.

Eyespots on the end of each arm enable sea stars to react to light, but it is through their touch and chemical senses that they normally find their prey. (And it is often through a chemical detection of their presence that their prey escapes, as pictured above and on the opposite page.) Sea stars move across the bottom not so much by moving their arms as by coordinated movement of the tube feet (p.108) that line the underside of each arm. Some large species are surprisingly quick—*Luidia sarsi*, for example, can travel at a speed of 30 inches a minute.

Their eating habits vary from the prosaic to the unnerving. Some sea stars swallow their food whole and digest it inside their bodies, in the usual way. Some feed on bottom detritus, cilia on the undersides of their arms moving the fragments along special grooves until they reach the mouth. But most sea stars have the unsettling ability to push their stomachs out through their mouths, turning them inside out in the process. With the "active side" now on the outside, a sea star can digest whatever it can touch with its stomach. Even more remarkable, it can push its stomach through minute openings in the tightly closed shells of its prey to digest its victims in place.

A striped sun star (the larger animal) wards off an attack by a morning sun star. Before the attacker gets on top, the prey manages to entangle it and roll it off. Notice that both have more than five arms.

In a typical attack, *Asterias vulgaris*, an East Coast species known as the purple sea star, will drape itself over a mussel and grasp the two dark shell halves with its tube feet, hundreds and even thousands of them tipped with suckers that form an unbreakable grip. The mussel closes tightly but cannot save itself. A gap of as little as a tenth of a millimeter (four-thousandths of an inch) is all the sea star needs. Eventually it finds one, pushes its stomach inside and digests the mussel.

Sea stars live in all of the world's oceans, from the turbulence of the intertidal zone to the cold, dark stillness five miles down. Most of the 2,000 known species are found in cold water at high latitudes, however; the greatest numbers and diversity occur in the Northeast Pacific from the Aleutians to Puget Sound. Here they can play a dominant role in structuring the biological community. The West Coast ochre starfish, for example, is such an effective predator that the lower limit of mussel beds coincides exactly with the upper limit of the starfish's foraging. When the sea star is removed, the mussels move downward, displacing sea anemones, barnacles and seaweeds as well as chitons, limpets and snails. It is the ochre starfish that keep the lower tidal zone and waters below open to diversity.

In tropical waters, sea stars are less significant predators. An exception is the infamous crown of thorns sea star (opposite), whose grazing on coral reefs caused much consternation in the late 1960s and early '70s (SMITHSONIAN, April 1970). Their numbers have since subsided. No one is sure why, but scientists suspect a natural population cycle.

Once they reach adult size, sea stars have few predators themselves. Gulls and sea otters take small numbers; the king crab preys on one species in Alaskan waters. People are sometimes a threat: children and skin-diving collectors, as well as oystermen trying to eliminate the competition. The most important predators are other sea stars: the morning sun star, for one, drops a raised arm onto another sea star and quickly tangles the arms and grasps the central disk of its prey (opposite, top). Some prey species are able to shed the arm the morning sun star first grabs, leaving solely that arm for the attacker to eat while the intended victim escapes. Sea stars can not only regrow lost arms, but a detached arm can grow into a whole new sea star.

Before the regenerative powers of the sea star became widely known, oystermen would gather the stars that were plaguing their oyster beds, chop them into pieces and throw them back into the water, never realizing that they were multiplying the numbers of the enemy in their own star wars.

Fred Bavendam is an underwater photographer who travels the world from his base in Kittery, Maine. This is his first appearance in SMITHSONIAN.

Here another morning sun star has overcome a painted sea star. Once on top like this, it has won.

The predator is faster and undeterred by pedicellariae (trumpet-shaped "forceps") covering arms of prey.

Spiny sun star has caught green sea urchin, will now push its stomach out of its mouth to digest victim.

Crown of thorns sea star grazes coral in the Red Sea. It is less dangerous to coral reefs than once feared.

Cookie star is a slow mover that feeds primarily on the biological debris it encounters along the bottom.

Size of diver dramatizes magnitude of this sunflower sea star, found off Stubbs Island in British Columbia.

Kelp flea, center, forages among tube feet of sea star. Tentacle-like feet end in suckers, operate hydraulically.

Branched arms of basket star (opposite) will unfold into tree shapes at night, creating trap for unwary prey.

By Helen Dudar

Those golden years when Hollywood was way back East

Once upon a time the red-hot center of film production was in, yes, Queens. Now cameras are rolling again, and so is a new museum

The only motion picture studio listed on the National Register of Historic Places sits 3,000 miles from Hollywood, in Astoria in the New York City borough of Queens. On the N train, it's a ten-minute subway ride from Bloomingdale's. Of course, movie stars don't ride underground unless the script requires it. During the glory days of Astoria studio silents, when Valentino swaggered and Gilda Grey shimmied and the new 20th-century mythology was flowering, cinema deities like Gloria Swanson made the trip over the Queensboro Bridge in great chauffeured sedans. At Astoria nowadays, they're turning out commercials and music videos as well as films, and the facilities have been modernized; a rock eminence on the order of Michael Jackson, who needs protection from his fans, can be driven directly onto a sound stage through a new rear entrance that accommodates celebrity-size limousines.

The new Astoria studio (renamed Kaufman Astoria Studios) is a 15-acre sprawl of two- and three-story whitewashed buildings, the oldest put up in 1920. They squat with a certain self-importance in an old neighborhood of tidy lower-middle-class homes and shabby warehouses. As a federally landmarked site, the establishment is perhaps uniquely unbeautiful: it is, after all, a factory, an enterprise dedicated to the pro-

Panoramic view of Astoria studio back lot shows set for an early sound film, *The Battle of Paris*, 1929.

Color photographs by Henry Groskinsky

Old Army film lab at 35th Avenue and 36th Street, Queens, is future American Museum of Moving Image.

Rochelle Slovin, museum's executive director, plans displays, theater, a sound stage to fill gutted space.

duction of shared fantasies to be sure, but a factory all the same. The astonishing thing about the place is that it is there at all.

Ten years ago, Astoria was on the edge of ruin. Scavengers, working by night, had stripped the buildings of copper wiring, brass plumbing fittings and any other material that was portable as well as marketable. Vandals had broken all the windows, and graffiti artists had sprayed memorials to themselves on the walls. Inside, the floors were occupied by pools of rainwater, small dead birds, shards of fallen plaster. The five acres of buildings with a colorful past were crumbling, having reached a condition that, one observer recalls, "resembled a bombed-out city."

Only a chronic optimist could have envisioned the transformation that has taken place since 1976. The commercial studios have grown and are flourishing in the hands of a private developer who seems certain he is creating the "preeminent communications center on the East Coast." At least equally significant is the bold and ambitious public undertaking called the American Museum of the Moving Image, which is under construction now, and by 1987 will be partly installed in a renovated old studio building amidst the Kaufman complex. Arguably, the most noteworthy aspect of both ventures is the rescue operation that gave them life. That business and the public interest are being served in Astoria is due largely to a small, oddly assorted band of stubborn or visionary or obsessed spirits who hated to see jobs and visible history go down the drain.

In the old days, crewmen called Astoria the "big house" to distinguish it from lesser stages scattered around the other boroughs. Between 1920 and 1932, Famous Players-Lasky (renamed Paramount Pictures in 1927) turned out 114 silent movies there (*Back Home and Broke, Moral Sinner, Tongues of Flame, Dancing Mothers, Salome of the Tenements*—ah, titles aren't what they used to be) and 38 sound feature films. In the period from 1942 to 1971, when military moviemakers occupied the premises, its past slipped through the cracks of contemporary memory. It's hard to find a mention of Astoria in most cinema histories and reference books.

But Astoria was a substantial property, a cluster of buildings with a fine main stage plus some subsidiary smaller stages, a back lot, offices, dressing rooms and carpentry shops—a serious establishment. W. C. Fields made his early pictures there and so did the Marx Brothers, shooting *The Cocoanuts* by day and cavorting on the other side of the river by night in their hit comedy called *Animal Crackers*. Clara Bow, William Powell, Rod La Rocque, Dorothy Gish, Jeanne Eagels —totems of movie legend—and director D. W. Griffith all motored across the bridge to labor at Astoria.

For a brief period in the '20s, the studio was also home to the Paramount Acting School, with a student body consisting of ten young women and ten men who had been tested in competitions all over the country and brought to New York for a six-month course. This single Eastern effort to train pretty young creatures for a life in film produced Buddy Rogers, a Kansas boy who graduated to slight notice as an actor, larger success as a bandleader and perhaps his greatest fame as the husband of Mary Pickford. The curriculum included careful attention to kissing. More than a half-century later, Rogers would recall with sly humor, "They taught us how to hold a kiss three minutes without laughing. You know, that was awfully important—it took three or four days to learn to do that."

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BUCKLE UP FOR SAFETY.

Paramount shut down Astoria in 1927, only to rush back into Eastern production when it became obvious that "talkies" were here to stay; the industry needed voices as well as faces, and theater directors skilled in the art of orchestrating spoken dialogue under trying conditions. In those days, the noisy, motor-driven cameras, along with their operators, were housed in little booths called "iceboxes" (not for the climate, which was tropical, but for the resemblance to the kitchen appliance). By the time George Abbott, the Broadway director, came along, the need for mobility had freed the equipment from containers; the cameras, he recalled recently, were stacked with piles of blankets that muffled the sound.

Abbott, now two years away from his 100th birthday and splendidly fit, worked on three early talkies at Astoria and carried away a single stark memory of the sybaritic star of *My Sin*. The leading lady was Tallulah Bankhead, an actress addicted to extravagant gestures. "She took baths in milk," he says. Fresh milk would be delivered daily in a huge metal container and the nearest strong arms, including the director's, would be drafted to help lift it and pour the contents into her tub. Soon after, Abbott decided that film was not where he wanted to invest his talent; he went on to the stage.

At Astoria, Ginger Rogers in her first major role in a feature, *Young Man of Manhattan*, was to be heard famously demanding, "Cigarette me, big boy." Claudette Colbert, a reluctant refugee from Depression-stricken Broadway, made her debut in sound around the same time in 1929 in *The Hole in the Wall*. "No one was used to sound and everybody hated it," she recalls. The director, Robert Florey, went around saying, "This is terrible, I don't think it will last." It was even more dire for an actress with a trained voice too powerful for the primitive early microphones. Colbert would deliver a line and as often as not hear the sound man lament, "She broke another one."

She starred in nine pictures in three years in Queens, playing opposite a glittering array of leading men, among them Gary Cooper, Frederic March, Maurice Chevalier. The crew thought Chevalier odd and parsimonious because he always brought his lunch to the set. In those less sophisticated times, it never occurred to them that a Frenchman might be accustomed to better fare than what the commissary's famously dreary menu offered. In 1932, Paramount stopped making features at Astoria, and Colbert went West to work.

Eoin Sprott's flying machine, used in Woody Allen film, is on loan to AMMI gallery of film memorabilia.

Projector of type used widely in the '30s and '40s is on display in the gallery, open before screenings.

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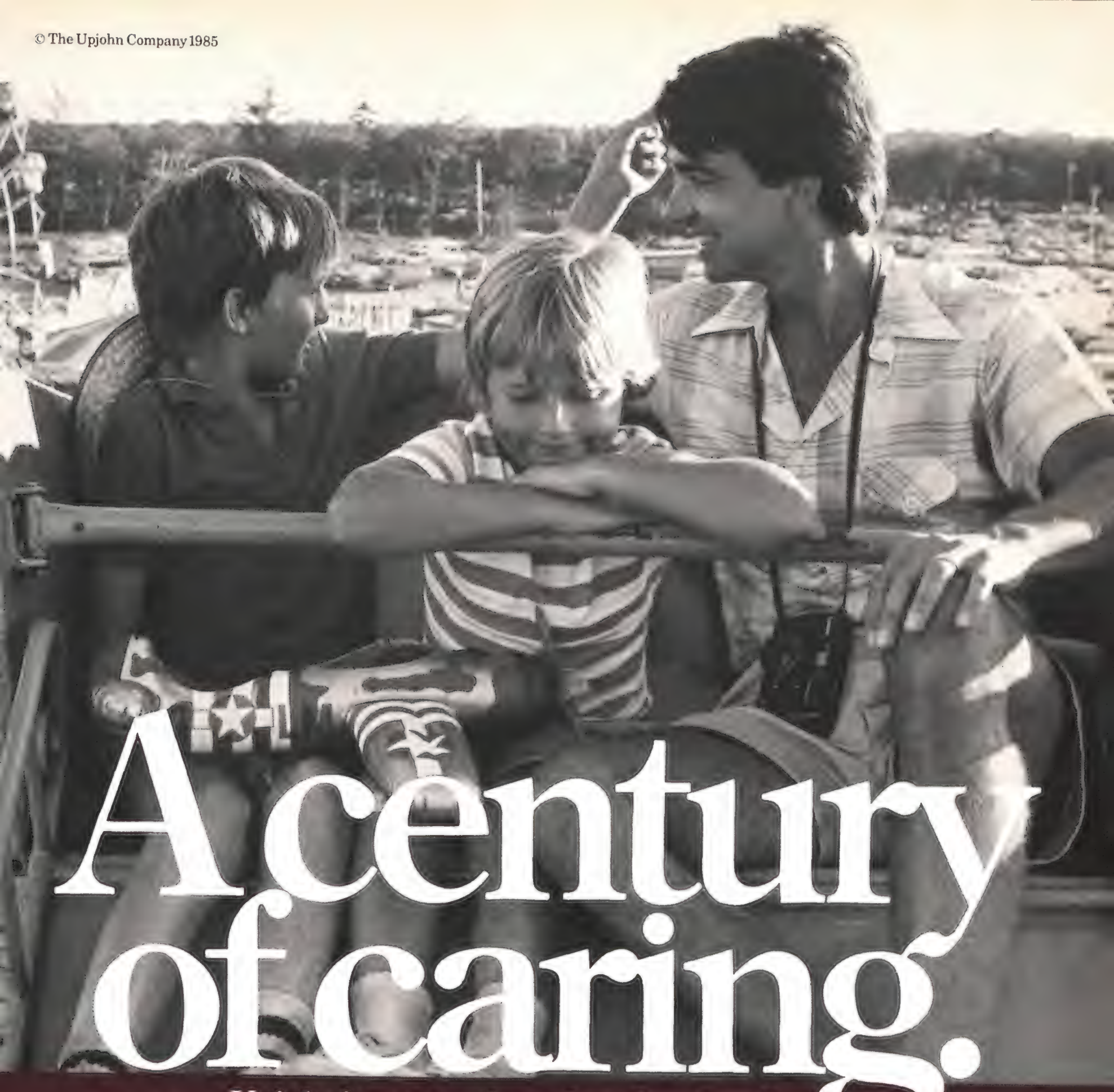

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Scenes from Astoria's heyday

For *Manhandled*, 1924, Gloria Swanson (above) had to take her first actual ride on subway.

Marx Brothers filmed *The Cocoanuts*, their first talkie, at Astoria in 1929. On Broadway, they starred nightly at same time in *Animal Crackers*.

Tallulah Bankhead (below) in scene from *My Sin*, with Scott Kolk at door. Filmed at Astoria in 1931.

Astoria commissary, busy place in 1924, is still in use today, still busy.

After her 50-year absence, Swanson (right) returns to Astoria for celebration.

Pioneer director D. W. Griffith poses with circus people (above) during filming of *Sally of the Sawdust*. W. C. Fields, in his first major film role, stands at Griffith's left.

The culture shock was grave. Every Sunday for a year, she would turn the radio dial to the New York Philharmonic broadcast and cry.

Long after the Long Island studio was a dim memory, a residue of nostalgic affection for Astoria lingered. Louise Brooks, the alluring and rebellious creature who was to fade from view in the '30s and be rediscovered in the '70s, began her career there in 1925 and gloried in the working atmosphere. It offered "complete freedom," she said a few years ago. "Of course, I didn't know it until I got to that police state in California."

Popcorn, the Colony and "21"

The day's work done, the players would travel back to the city, inching across the bridge in clotted evening traffic and relieving the monotony of the ride by "throwing popcorn out the window to friends. . . . We would dine at the Colony or '21' or we went to the theater, we went to the opera, we went to the ballet. And you know in California they had absolutely nothing, nothing. . . ."

In her memoirs, the late Gloria Swanson also remembered Astoria as a kind of paradisaical workplace. In the age of the silents, she wrote, "The place was full of free spirits, defectors, refugees who were all trying to get away from Hollywood and its restrictions. There was a wonderful sense of revolution and innovation in the studio in Queens." She had literally fled Hollywood, claiming an illness that required treatment in New York, and then had settled down to work in Queens. The premiere female star of the period, she was not your everyday revolutionary. Louise Brooks once wandered into the wardrobe room at Astoria and found herself facing an amazing array of footwear, "rows and rows and rows of little tiny shoes." The diminutive Gloria Swanson had a passion for shoes and owned hundreds of pairs. (There is a vast storehouse of such film lore and anecdote and history in the American Museum of the Moving Image oral history collection, to which this writer is grateful for some of the quotes in this article.)

More than a half-century later, Swanson, then in her 80s, became a supporter of the newly revived Astoria. Before her death in 1983, she also haunted the place with pathetic urgency—*Sunset Boulevard*'s Norma Desmond reincarnate. "She'd come out every two months or so," says Lawrence Barr, who has overseen studio operations since 1977. "The place was a wreck when she first came. She'd call me up and insist on two things: a red carnation and a clean ladies room. We'd send a car for her. She just wanted to walk around the stages where she 'grew up,' as she used to put it."

Barr always personally shepherded her about. It's hard to imagine a more suitable guide. His father was a prop man at the studio in the early years, and later, during the period of the U.S. Army's long occupancy, Barr labored on sets as a grip. His mother often worked as an extra and, in the absence of baby-sitters, would bring along her two sons for the day. Children were enlisted as playmates when new young talent was being tested at the studio.

Father sometimes came home to the Bronx with souvenirs of his work, the most lavish a six-foot cake that had been a prop in a movie and that kept the Barrs and their neighbors in dessert for a week. One evening in 1938, Barr arrived home rather dramatically coated with soot. The day's shoot had involved torching a tenement for *One Third of a Nation*, a socially-conscious work starring Sylvia Sidney. The film was also noteworthy because it was one of the last commercial movies made in Queens before World War II and because it featured a child actor named Sidney Lumet, who would grow up to be a Hollywood-avoider, dedicated to making movies at the new Astoria.

When war came, the Army Signal Corps, in need of a studio to shoot training films, moved in, added several buildings to the Paramount complex and stayed for nearly 30 years. In peacetime, Astoria became the Army Pictorial Center and served as a testing ground for fledgling actors. Tom Hanlon, the sound chief, watched a parade of Broadway unknowns work before the camera, among them Charlton Heston, Paul Newman and Jack Lemmon.

A sound stage like a tuned violin

The pace was frenetic. "We produced nine reels every 16 hours, the equivalent of a feature film every two days," says Hanlon. "We had our own animation department. We worked in 15 languages. Monday and Tuesday, we'd have a German street, Wednesday we'd build a jungle so authentic you could almost get malaria there. Paramount had installed sound panels on the big stage in 1928 and it's one of the finest sound stages in the world. It's like a tuned violin."

Under Congressional pressure to disperse its film work to private contractors, the Army left Astoria in 1971. It spent another two years moving out equipment, and then gave the property to the City University of New York (CUNY) for an "educational purpose." The idea at the time was that it might be developed as a campus for the newly-established LaGuardia Community College. What followed instead were four years of indecision and decay. Nobody seemed to be able to figure out how to use the property, and there was reason to worry, according to Glenn Ralston, that the entire complex might be torn down.

In 1972, Ralston was a city planner in the Queens

Lobby card advertised an Astoria-made movie starring Frederic March and Claudette Colbert.

Borough office, overseeing a district that included Astoria. Guided through the buildings by a troubled Hanlon, he realized at once that not only was this a place with an important history, but "a phenomenal facility" for filmmaking as well. Ralston was to spend much of the remaining decade laboring to save it, in concert with an ad hoc coalition of fellow worriers. Among them were John McGuire, a Screen Actors Guild executive; Larry Barr, then business representative of the Motion Picture Studio Mechanics; and Sam Robert, a former set decorator and a founder of the Council of Motion Picture and Television Unions. All were concerned that a major source of jobs had disappeared with the Army's departure. Help would also come from the local and state bureaucracies which had a clear interest in the taxes and other revenues that would flow from an active studio.

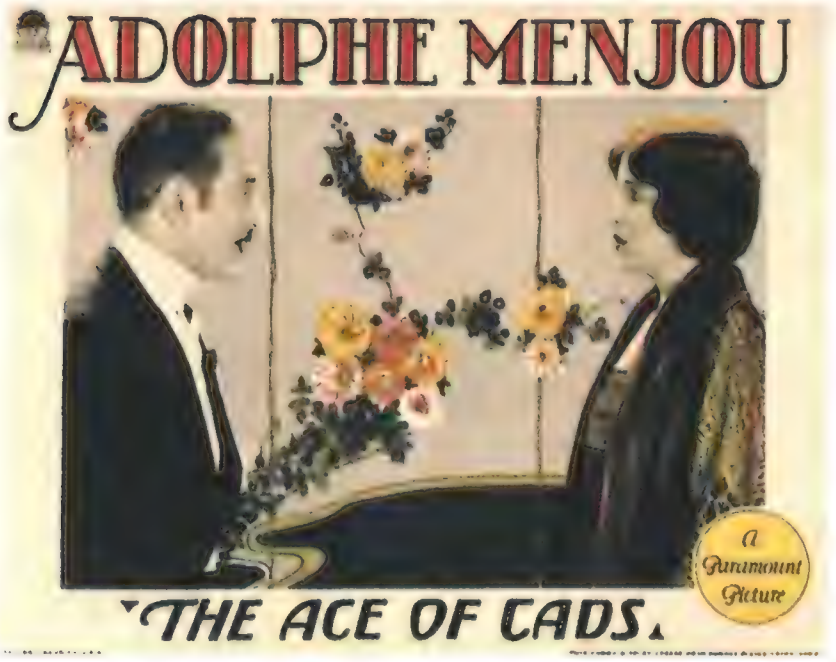
CUNY actually managed to attract two feature productions for the stages in 1975 and 1976 (*Thieves* and *The Next Man*), but the high costs of maintaining and protecting the place were beyond its means and experience. By 1976, damage to the studio buildings was estimated at $4.5 million and bold measures were needed to save them. The mechanism of salvation was complicated: it turned out that this piece of federal surplus property, which one real estate authority says could not be replicated for less than $100 million, could be given to New York City if it were first granted a landmark designation and then leased to a nonprofit institution. Ralston wrote the application for the National Register; the eventual conclusion was that Astoria deserved its protection. In preparing this document, Ralston relied on the research of Richard Koszarski, now curator of historical film programs for the museum and an authority on the history of the studios.

Even before the designation came through, the new Astoria Motion Picture and Television Foundation had taken over. The unions held fund-raisers and found money for start-up expenses in their own treasuries; there was casual talk of launching a museum which would certify the group's "educational" interests. Ralston had begun to prowl local flea markets, buying up old posters, lobby cards, antique photographic equipment—the sort of memorabilia few collectors sought.

By the close of 1977, the foundation had a $300,000 grant from the state legislature and was fully in charge of the studio. For a time, Barr, working out of his union quarters, ran the studio operation without pay, and Sam Robert kept a part-time office there. With cash flow at a minimum, they had to hunt down local tradesmen—trash collectors, plumbers, roofers—who were willing to wait for payment. In fact the community, a stable, largely Greek-immigrant population, was happy to see the rebirth of property that had become a neighborhood eyesore. "There were constant financial crises," Ralston recalls. "We were always facing a $150,000 deficit." On slow days, Robert, who was over 70, and Barr could be found on a local street corner selling "Save the Astoria Studio" buttons.

"The unsung hero of that period was Sidney Lumet," according to Ralston. The enterprise had its share of naysayers forever predicting doom. A major New York producer insisted that the studio was a firetrap. But Lumet chose to make a $24 million musical, *The Wiz*, at Astoria, and persuaded the producing company, Universal Studios, to advance rental fees of

New York author Helen Dudar writes widely on contemporary American culture and is both an affectionate and demanding student of movies.



Highly effective in design, lobby cards weren't meant to be subtle; they were aimed at luring the public.

Tin box cover, for bonbons or what-have-you, showed Valentino at height of his popularity as *The Sheik*.

$225,000 so that dressing rooms and other blighted spaces could be refurbished. "It was crucial, it got us off to a roaring start," Ralston says. Lumet went on making movies there, followed by a steady parade of first-class films (among them *Hair, All That Jazz, Going in Style, Eyewitness, Arthur* and *The World According to Garp*).

By 1980, however, it was obvious that a substantial infusion of capital for renovation and modernization was needed to keep business growing. The city looked for and found a new partner, George Kaufman, a New York developer with show-business connections. Almost at once, Kaufman attracted some splashy investors, among them Johnny Carson, Alan King, Gregory Peck and Neil Simon. He painted and plastered; he built new sound stages and two recording studios; with commercial rents 50 percent below Manhattan rates, he lured a stream of permanent tenants ranging from a major film-equipment rental service to small production outfits, an accounting firm specializing in theater folk, and a chiropractor presumably experienced in treating show-business spines. Kaufman also quietly bought up neighboring small plants, creating a 15-acre ten-building complex that he expects to keep filling with tenants. The principal buildings are now festooned with fluttering blue banners that inform the world that here dwells the newly renamed Kaufman Astoria Studios.

The governing board of the property became a unique tripartite collaboration of city, private enterprise and public foundation. And then, having seen the studio pass into Kaufman's hands, the foundation faced the question of its own future role. Ralston had helped launch and run a small public program, and a

World War II Army poster promoted film directed by John Huston. Film crew worked at Astoria studio.

start had been made on collecting oral histories from a dwindling band of film people who had once worked at the old studio. Even so, few of the original brotherhood of Astoria-savers took the activity seriously. "In the beginning," Larry Barr says, "the museum was a vehicle to keep the studio. We had to come up with an excuse, an educational purpose to give the government a legal reason to transfer the property."

Nobody reckoned with the forceful presence of Rochelle Slovin, a smallish, dark-haired woman with a demanding, sinewy intelligence and a capacity for taking infinite pains. Slovin had begun her adult life as an actress and graduated into local government, picking up a master's degree in business administration along the way. She was running a huge government-funded artists project for the city when the foundation board chose her out of a field of more than 200 applicants to be its executive director. "I came in January 1981 and was handed 90 keys," she says wryly. "The place was a vast dump, but a small staff had already begun preserving its history."

Shelly Slovin, who does nothing without organized study, examined the field and discovered that the United States did not have a single public institution entirely devoted to displaying the history and technology of film and television. (A Los Angeles effort, begun in 1962, foundered for a variety of Hollywood-style reasons. For two decades, a legendary trove of donated objects—archival material and artifacts—moldered in storage in the old Los Angeles municipal jail. A few years ago, what had not been looted or damaged was divided among several West Coast institutions.) Slovin's proposal was to create the American Museum of the Moving Image, a venture that would attempt to deal with film and television as art, history, technology and, above all, as a powerful social force.

Tony Walton

At studio in 1985, Volker Schlöndorff directs Dustin Hoffman, Kate Reid in TV film, *Death of a Salesman.*

In AMMI storeroom, Tom Hanlon (left) and Larry Barr discuss the new museum. Both helped to found it.

LIMITED EDITION

The distillers of Beefeater® Gin, in association with the British Royal Mint, announce a unique medal to commemorate the 500th Anniversary of the Yeoman Warders.

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Out of one study came the choice of Building 13, once the Army's film laboratory and now boarded up and gutted; it is large enough to accommodate loftlike exhibition spaces and a 200-seat theater. Slovin consulted film scholars and read film books, and for her director of interpretation hired Robert Sklar, a New York University professor whose book *Movie-Made America* is a seminal history of the impact of film on the American culture. She helped find a name with the kind of easy acronym, AMMI, that has the friendly resonance of the crowd-drawing Museum of Modern Art's MOMA, and she began the effort to raise the $10 million required to create the project.

In the foundation's temporary quarters, she also organized a small exhibition area and a regular program of films aimed at "demystifying the site." This is a polite way of acknowledging that Queens has an image problem or, as one museum staff member bluntly put it, "Archie Bunker did us in." The number of visitors for the Friday and Saturday programs has grown encouragingly from a trickle to a respectable size. Movies are shown in the main building's theater where once such legendary figures as Adolph Zukor and Walter Wanger sat to watch the rushes of the day's work.

For starters, Valentino, Pickford, Chaplin

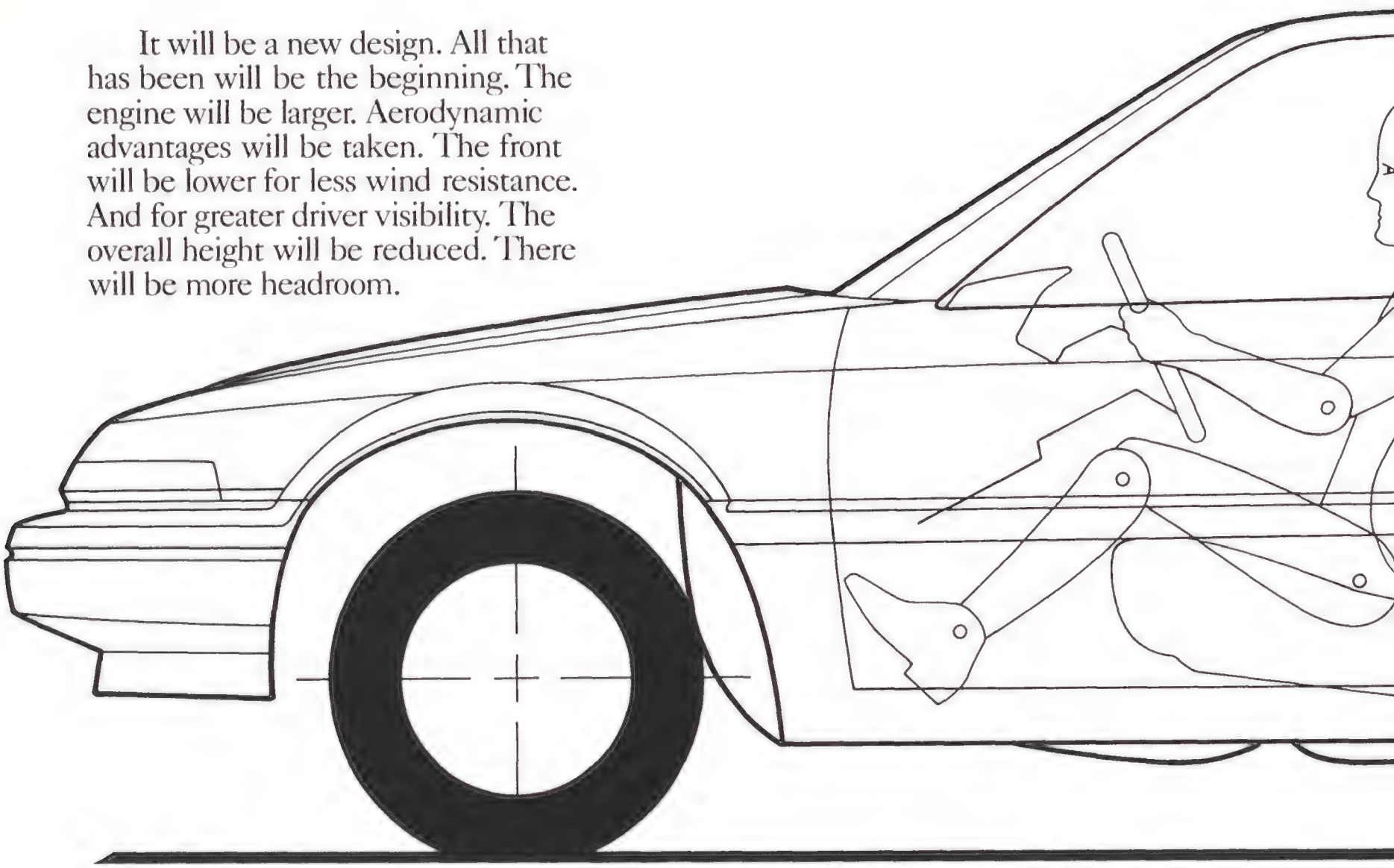
In a few years, the AMMI collection has grown from Glenn Ralston's hoard of flea-market buys to 60,000 objects. The museum owns important antique movie equipment, including one of the world's largest collections of 3-D apparatus; an impressive collection of set models, props and costumes; a vast store of Valentino material; many old posters and lobby cards; a Pickford letter; a Chaplin pencil box; one woman's teenage accumulation of every fan magazine published between 1939 and 1950; silent-era magic-lantern slides with such messages as "Don't spit on the floor" and "Let us stand by President Wilson who kept us out of the war"; and the yellow-brick road used in *The Wiz* which, alas, turns out to be a roll of kitchen linoleum.

It isn't Slovin's intention simply to hang stuff on the wall or enclose it in glass cases. On her own time, at her own expense, she has examined the successes and failures of many museums, 22 in all, devoted to history or technology and stretching from California to Germany. She wants, for example, to install displays that will tell us something about how film and TV impinge on our lives and dreams. On commission, Red Grooms (SMITHSONIAN, June 1985) is building a 35-seat theater he calls Tut Fever—evoking the picture-palace phenomenon of the '20s—and Nam June Paik, the famous video artist, is preparing a 150-screen work. Slovin is planning a replica of a working sound stage that will demonstrate how movies are shot; she is contemplating "interactive" equipment that might offer a visitor the chance to shoot and edit a bit of video tape or to learn about the meaning of photogenicity through a screen test. She doesn't see why a museum shouldn't offer fun and games along with education and enlightenment. The idea is to duplicate the sensation that arrives once in a great while at the fade-out of a movie you know you will remember forever. Shelly Slovin likes to think of it as a eureka experience.

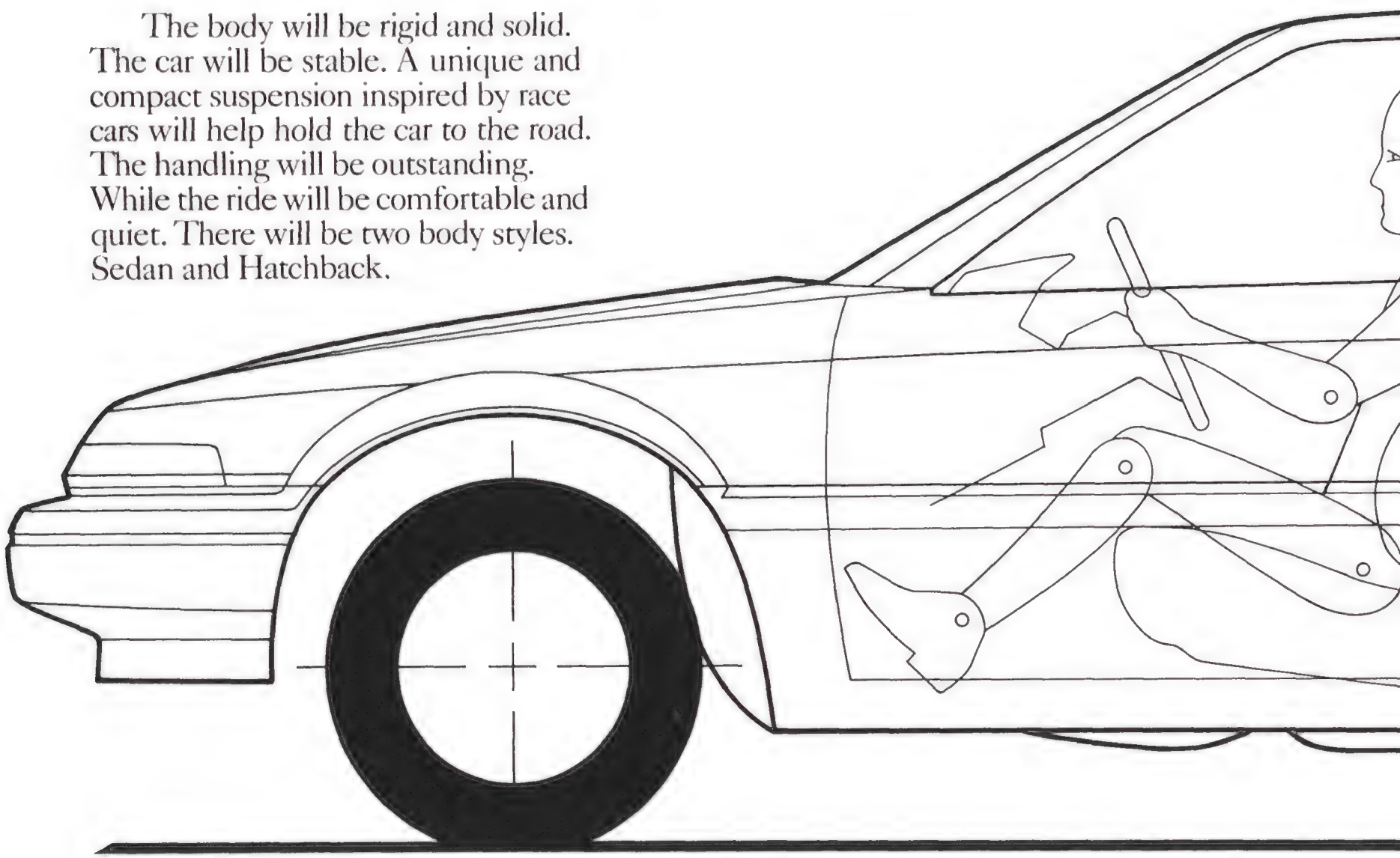
AMMI collection includes this Powers Cameragraph #6 movie-and-slide projector, vintage about 1910.

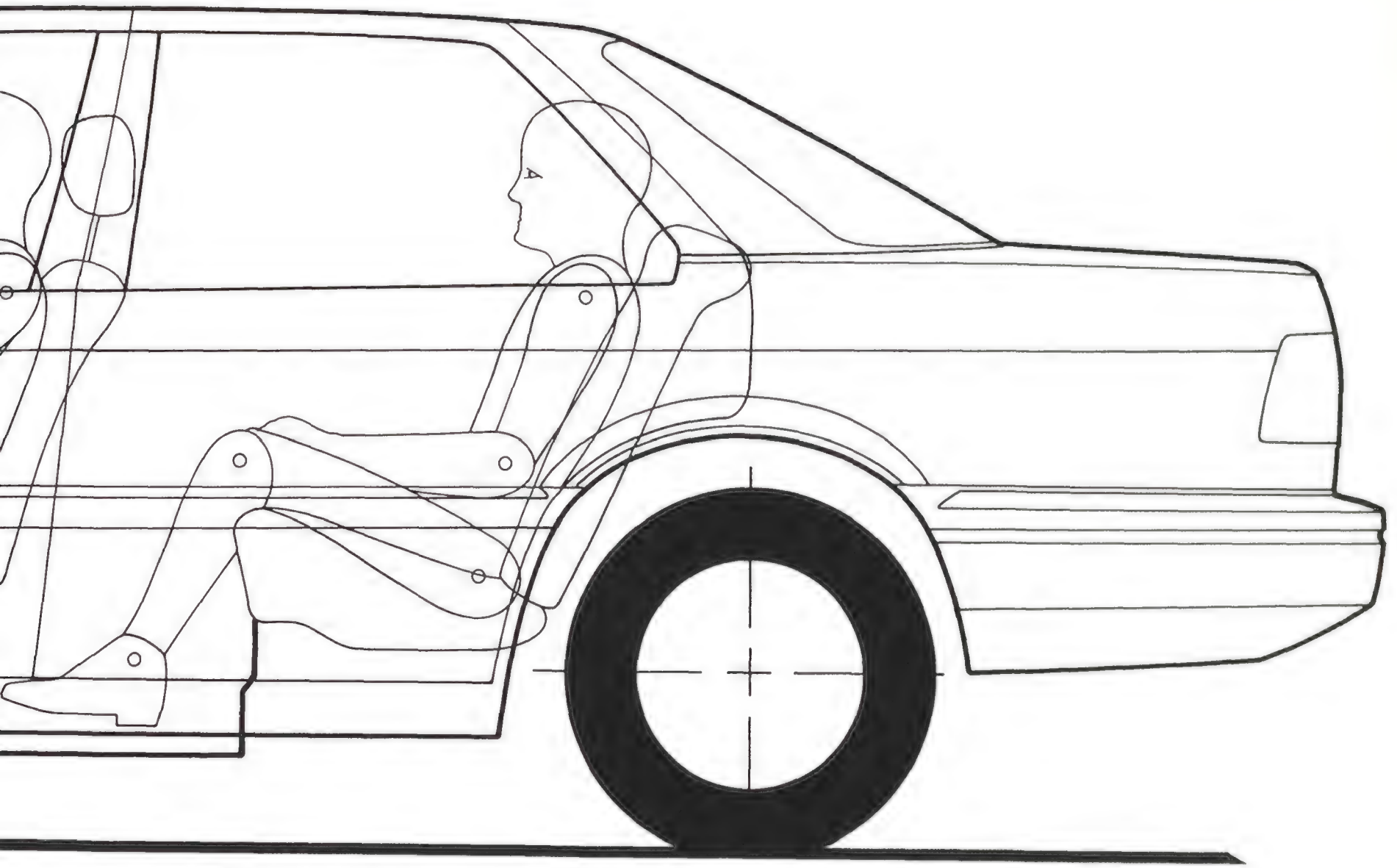
What will be.

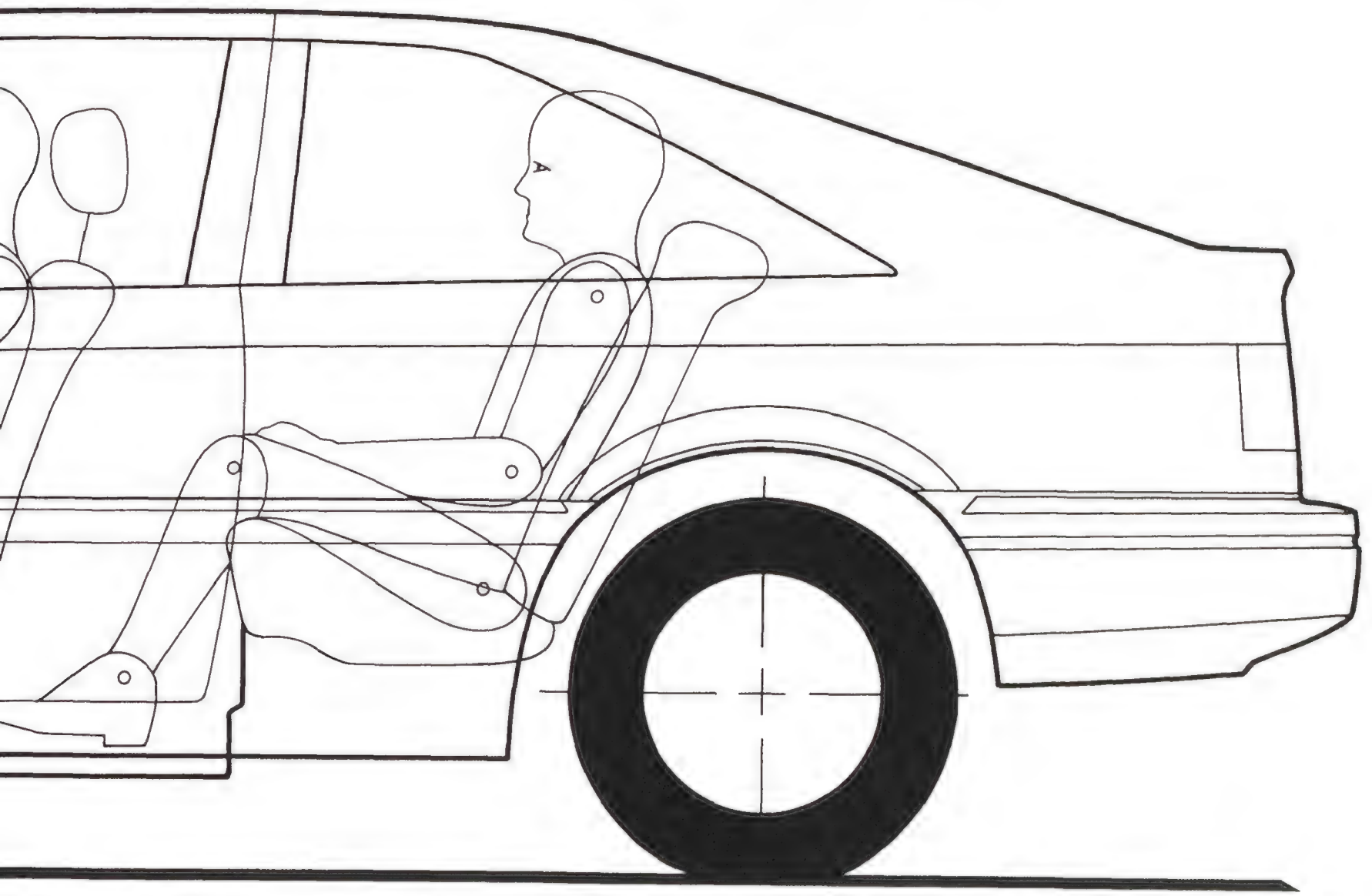
It will be a new design. All that has been will be the beginning. The engine will be larger. Aerodynamic advantages will be taken. The front will be lower for less wind resistance. And for greater driver visibility. The overall height will be reduced. There will be more headroom.



The body will be rigid and solid. The car will be stable. A unique and compact suspension inspired by race cars will help hold the car to the road. The handling will be outstanding. While the ride will be comfortable and quiet. There will be two body styles. Sedan and Hatchback.

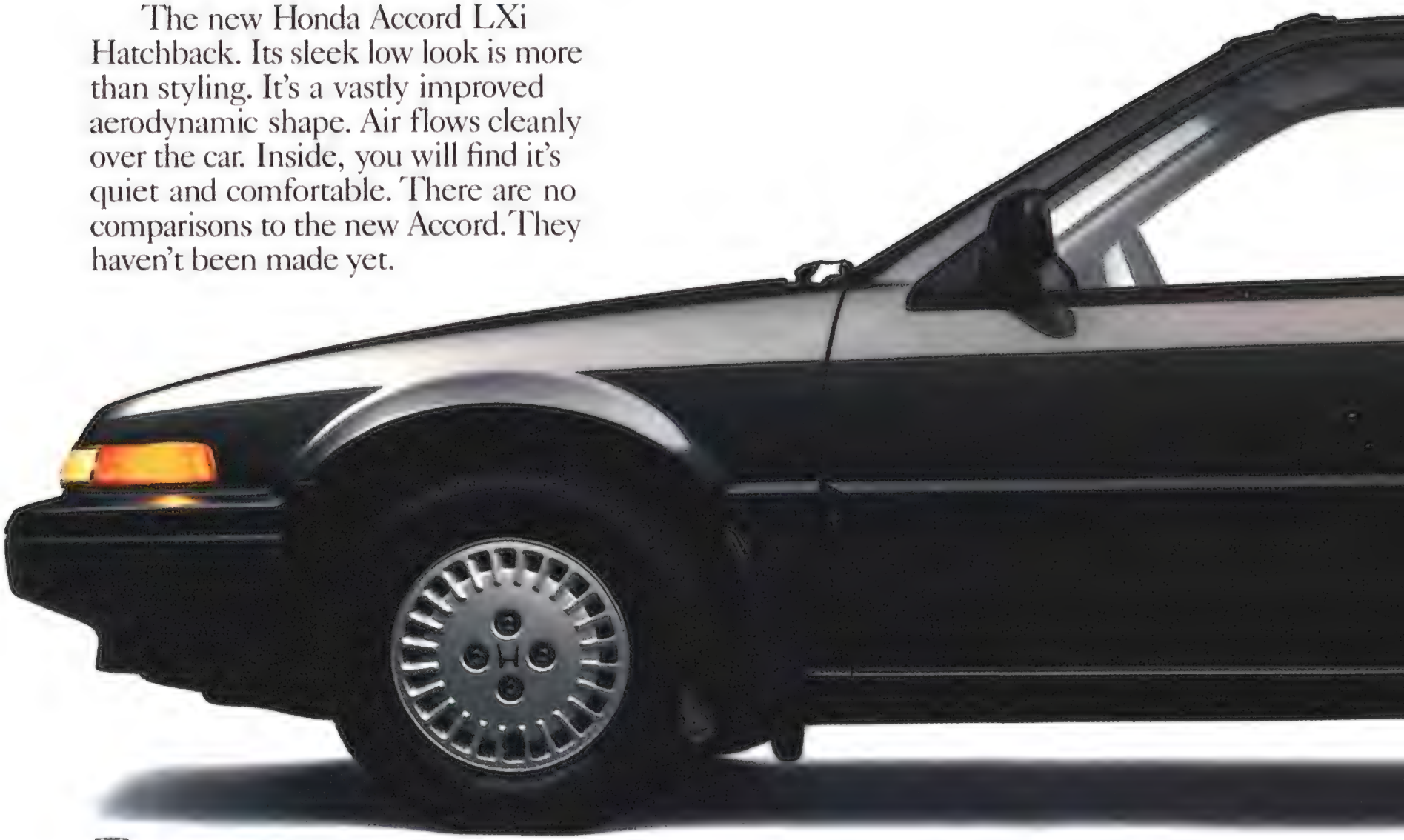






The new Honda Accord LXi Sedan. It's the first ever front-wheel drive car with double wishbone suspension on all four wheels. It rides smoothly and comfortably over city streets and highways. It handles like an absolute joy. Every convenience has been considered.

The new Honda Accord LXi Hatchback. Its sleek low look is more than styling. It's a vastly improved aerodynamic shape. Air flows cleanly over the car. Inside, you will find it's quiet and comfortable. There are no comparisons to the new Accord. They haven't been made yet.



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The New Accord HONDA

Outside Ting-kyu village in Dolpo (elevation, 13,500 feet), early winter snow blankets mountains.

Article and photographs by Eric Valli

Life in Dolpo reflects rugged simplicity—as it has for centuries

A woman spins wool as she strolls past three *chortens*, Tibetan shrines that symbolize universal Buddhahood.

In Nepal's mountainous frontier, existence is a delicate balance of yaks, Buddhism, barter and humor

"*La so so, lha gyelo!*" The god is victorious! We have reached the 17,000-foot-high pass called Kagmara, "place where jackdaws die," and the frigid air is too thin for wasting words.

I stop in waist-deep powder below glaciers that appear to flow motionlessly down the mountains, and, finally, silence drowns the dull tattoo of my heart. We start the long descent through snow so light it offers no support. Karma has been breaking the trail 50 yards ahead. Now Lakpa takes his place and Karma, resting while I pass him, brings up the rear. Thus we lead each other into this vast hollow of relentless white, three dots moving through an immaculate, dazzling universe. Here, it seems, there has never been anyone but us; yet the climb began only three days ago. One after the other, aching with cold, we cross snowfields that threaten to avalanche.

From dizzying emptiness to a realm of color

For two days more we advance this way, and fatigue joins us like a fourth companion until the blanket of snow starts growing thinner, like our strength. White fades to brown, then gray and ocher. We leave dizzying emptiness and slowly enter a realm of color. A snow leopard's prints mark the moist ground. Then, beyond a torrent, five black yaks stampede down the slope. The gorge opens to reveal snowcapped mountains, sheer cliffs, steep slopes of slaty scree and barren, brown valley floors: Dolpo.

Ancient Tibetan legends call this region Sbas-Yul, "the hidden country." It remains remote even from Nepal, of which it is a northernmost part in law if not in culture. It is separated from the rest of that kingdom by the Dhaulagiri range to the south and by the Tibetan plateau to the north. Dolpo's valleys nest between these barriers at an altitude of more than 13,000 feet. Some of the villages in its higher valleys are at almost 14,000 feet, which places their inhabitants among the world's highest dwellers.

Surrounding governments may come and go, but Dolpo remains, inhabited for at least ten centuries by people of Tibetan blood and custom. It had no name on Western maps until the Englishman David Snellgrove, a Buddhist scholar, explored the region in 1956. For seven months he journeyed throughout the Tibetan-speaking valleys of western and central Nepal, documenting the religious and social customs of the people and the geography of the area. His journal, *Himalayan Pilgrimage*, remains one of the most informative sources on Dolpo and the other frontier regions of Nepal.

Only a handful of foreigners managed to come in the half-century before Snellgrove's visit. All others were deterred by the world's highest topography or by

Cairn at summit of pass is augmented by yak skull; each traveler who crosses adds a stone to the pile.

a government that, uniquely leery of outsiders, restricted their access to this place. In 1973, biologist George Schaller obtained special permission to study bharal (the Himalayan blue sheep). He was accompanied by writer Peter Matthiessen, who sought the snow leopard.

A decade later I became one of the few other Westerners permitted to track this world of harshest reality and mesmerizing myths beneath peaks approaching 27,000 feet. Here I found, in the scattered villages of the region, some 4,500 souls who center their lives around Buddhism, barley, yaks and barter.

Dolpo's history is an enchanting mix of myth and fact. Once upon a time, when Padmasambhava brought Buddhism from India to Tibet (which occurred in the eighth century A.D.), a demoness fled from him. She offered a turquoise to the people of a village in exchange for their promise not to reveal where she had gone. But the powerful guru transformed the gem to yak dung, and the villagers, thinking they had been cheated by the demoness, betrayed her. In vengeance, she flooded their valley, which vanished beneath turquoise water. Thus Tso was born, a lake named simply by the word that means "lake" in Tibetan, a language I do not fully command. Called Phoksumdo on English maps, Tso's milky-green water lies frigid between gigantic ocher cliffs that rise hundreds of feet to a rock pierced by a single hole. In midwinter, the sun shines through this opening in the rock to strike Tso Gompa (the Temple of the Lake).

Tso Gompa is one of Dolpo's half-dozen Bon-po monasteries. Bon-po takes its name from Bon, an indigenous shamanistic religion that predated the introduction of Buddhism into Tibet. Today, Bon-po is a blend of Buddhism and Bon's animistic deities. The lama who led us to the monastery door turns his prayer wheel counterclockwise, contrary to the practice of other Buddhists. In the mountains, one knows a Bon-po Buddhist from afar by the way he passes each wayside shrine by walking around its right side. There are adherents of other Tibetan Buddhist sects in Dolpo besides Bon-po, and they too maintain temples and monasteries. But all coexist peacefully.

Pitching our tent on an earthen roof

The village of Tso, like every Dolpo hamlet, is a cluster of two-story houses with inward-sloping walls of mortared stone and air-dried earthen bricks. The flat roofs are covered with earth, one side bounded by a sort of shed for storing packsaddles, plows and fodder, the other sides shaggy with brush collected for fuel. When we arrive at Tso, we pitch a tent on a roof —driving pegs into its clay—and rest for a few days, preparing for our trek northward to inner Dolpo in

In August, during barley-growing season, irrigated fields of Phijor in northwest Dolpo turn a rich green.

By November, after the same village has harvested crop, lack of trees and other vegetation is more evident.

the higher valleys. Our hosts tell of Mi-te, the "fleeing man" who lives in the surrounding forest and is known abroad as the abominable snowman.

After four days we reach Phijor (above), like every village an oasis. It boasts 25 brush-crowned houses surrounded by a ring of barley and wheat fields enclosed by stone walls. Crops and weeds alike grow only where the land is irrigated with water led from a river through narrow ditches that may run one or two miles. In a valley that receives less than 12 inches of rainfall a year, water is a precious commodity. Beyond the moisture's reach, the barren soil stretches toward gorges between pink mountains topped with glaciers.

Eric Valli has traveled among the Tibetan cultures of the Himalayas for six years. His photographs of yak caravans appeared in the October 1982 issue.

There is not a tree beyond the three groves of willows in the village, and except for the hamlets of gray houses and ocher temples, Dolpo seems an empty land. Occasionally a pair of raptors crosses the sky, while prayer flags mounted on house rooftops flap in the wind, beating numinous messages.

My guide Lakpa, a Sherpa born in Nepal, is known throughout this country and welcomed everywhere. At Phijor, a trader named Tshewang offers his hospitality, leading the way into a windowless room where two calves are shackled among piles of packsaddles and dried yak dung to be used for fuel. A single log notched with steps rises between the rafters, which have been covered with earth.

In the room above, Tsiring-Palmo, Tshewang's wife, spreads a yak hide on the earthen floor and bids us to sit. We offer her a brick of tea, the leaves compressed

Returning home from east through Tudje-La Pass, 17,400 feet, a Dolpo mother pauses to nurse her baby.

like plug tobacco, a welcome gift. Squatting, she strikes steel on flint to make a fire so that she can prepare some refreshment for us. I feel the cold as it departs in the heat of flaming yak dung.

Our hostess laughs while telling us that, after two years awaiting Lakpa's return, she gave up and married off her daughters. The jokes are bawdy. Many children are conceived outside marriage; Tsiring-Palmo herself has two husbands, Tshewang and his brother. Such polyandry is common, since a household needs one person to farm, another to carry on distant trade, and a third to care for the animals. The children of such marriages are considered offspring of the elder brother; the younger brother is called their uncle.

The room is warm and dark, lit by the leaping fire. The walls bear shelves holding valued essentials: cloth sacks for flour, wooden cups and ladles, chili mortars, a few brass bowls gleaming dimly. Soot covers every-

She had accompanied her husband, an itinerant stone carver, to a village across the Dhaulagiri range.

thing as smoke drifts toward a small hole in the ceiling that admits a few drops of rain. Two wooden bins hold stores of grain and salt. Yak statuettes roughly fashioned of earth and flour paste protect the house from lightning and evil spirits.

Tsiring-Palmo scrapes tea from the brick into a kettle. When it has boiled into a strong brew, she pours it into a tall churn, adds a large dollop of yak butter and a small handful of rock salt, and agitates it all into

In lower Nepal, a Dolpo trader has brought yaks bearing salt (inside bags) to be exchanged for corn.

For brighter light, bootmaker Tshewang adds chunk of sap-rich pine to fire; yaks carried wood from south.

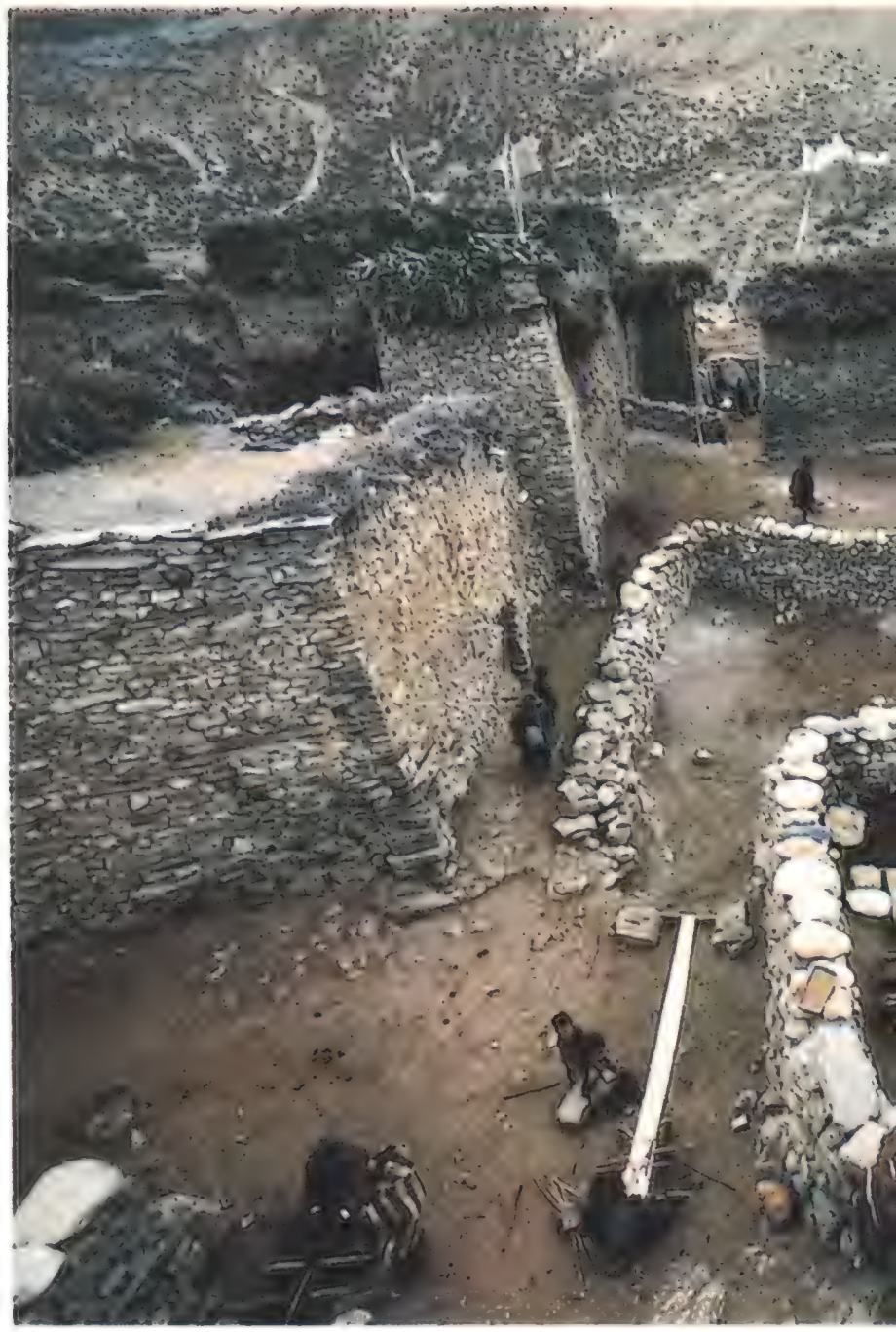
Preparing for a trip to the south, a Dolpo trader, with wife's help, secures bags of salt he got in Tibet.

a rich, regenerating broth. She then puts the four ingredients of *pak* into individual wooden cups—some butter, powdered cheese, *tsampa* (roasted barley flour) and, for liquid, some of the tea. She hands a cup to each of us. Careful never to spill and waste the gods-given bounty, we hand-mix the ingredients into a thick paste. In Dolpo, this raw paste passes for daily bread; for feasts it is made more palatable with precious sugar.

Tshewang makes *suebas,* woolen boots soled with thick yak leather. My hope is to get a new pair to replace my worn ones. But when I unfold my legs for a fitting, he exclaims that my Western feet are too big. "I have never sewn boots of that size. It is not possible," he laments. He remains unpersuaded until he picks up my porcelain cup, weighing it in his hand, ringing it with his finger and studying the blue dragon that adorns it. Though China is only a two-day walk away, porcelain goods rarely find their way here. For several cups like these, Tshewang allows, he could do the impossible for me.

A man of many skills, Tshewang joins the caravans every summer to Tibet, where the Dolpo-pas (men of Dolpo) trade grain for salt, though they grow only enough for half their own needs each year. The system benefits all: Tibet needs barley, buckwheat and maize even more than Dolpo. Before a caravan can depart, a lama's counsel must be sought, for no major decision is made without consulting the gods.

The summer caravans trade their grain for wool and rock salt from the salt flats in Tibet. In late autumn, the Dolpo-pas then carry their Tibetan salt and wool south into Nepal's lower valleys where they trade it for grain and other essentials—food for themselves and the wherewithal for trade up north next year. Since the military occupation of Tibet by the People's Republic of China in 1959, the border has been closed. But both Chinese and Nepalese authori-



Inside walled compound at Charkha, women weave long strips from wool obtained by trade with Tibet.

On a fall evening in Shimen, woman winnows barley; she first whistles to call the wind, then tips basket.

Men will sew wider bands together to make blankets, clothing; narrower band at left will be used for belts.

Young woman spins raw wool; coral, turquoise, amber of her necklace came from trade, mostly with Tibet.

ties now tolerate continued trading, without which these people would be unable to survive. So the caravans continue, as they have for centuries, albeit on a more limited scale. Within its boundaries and beyond, barter is the basis for Dolpo's economy.

All summer we roam Dolpo, passing from one valley to another, penetrating the hidden country little by little. Often we reach a place only to learn we are expected, for news of the stranger travels faster than we walk. They call me Go-serpo, "Yellowhead." However far we travel, the distance seems farther in time: herding sheep and making hard cheese, these people seem like my own medieval French ancestors, whose feudal hamlets were in some respects similar to Dolpo's.

By summer, the tents of nomadic shepherds dot the high pastures after light rains raise a thin green lawn on the rocky slopes. Hiking up to such a camp, we are greeted by huge black dogs with yellow brows, straining at their chains and barking fiercely. These Tibetan mastiffs are unleashed only at night, when they guard the livestock from wolves.

The other sound as we approach comes from inside a yak-hair tent: the dull, rhythmic noise of milk being sloshed to butter in a yak-skin bag. An old man turns back the flap of the shelter but does not answer when we ask if he has any butter to trade or sell for rare money to even rarer travelers. He seems deaf as he mutters under his breath. Only after he has confided his prayer to the wind will he smile and admit us.

He offers us bowls of buttermilk before we begin to bargain for the fresh butter, which can last a year when sewn tightly into sheepskin envelopes. Quantities of buttermilk foam in a caldron on the hearth. Once it boils down to a thick film, it will be dried in the sun for several days to become *chourpi*, a cheese so hard you must chew a wad of it for ten minutes before swallowing. The women outside milk goats tethered head-to-head in a long row.

Magical evenings in high-pasture country

As in the villages, before people drink tea someone flicks a few drops into the air, an offering to the spirits. Cold evenings in the high-pasture country are magical as shepherd families gather around a fire beneath the stars. Men with braided hair ask me why night follows day and I illustrate my reply by walking around the low blaze turning a potato in the firelight. In turn, they explain to me that the axis of the universe is Mt. Kailas in Tibet (SMITHSONIAN, May 1982), and that Mahaba rages across the heavens with his arms spread angrily as he chases his wife's abductors. I had known the pursuer as Orion and his distant quarry as the Pleiades.

One afternoon a teenage girl spreading fresh *chour-*

Overleaf: In October at Ting-kyu, villagers thresh barley they have harvested from fields in background.

Rocky streambed flanked by scree and steep cliffs is typical of terrain Dolpo villagers regularly hike.

pi on a blanket to dry asks me, "In your country, so far away, is the sun larger than here?" I answer that it isn't. Having heard of certain wonders beyond these valleys, she is disappointed. "Ah, it is not larger, like the sun of Kathmandu?"

Karma has lived in the trading city of Jumla in western Nepal since the Chinese invaded his native Tibet. He gladly treks into the high country where wives dab butter on their husbands' heads for protection. Each yak has butter on its brow and horn tips, because gods and spirits like butter. They alone can protect men and animals in this country of rushing torrents, narrow scree paths beside sheer cliffs, rockslides and blinding wind.

Sometimes, in our travels from village to village, we join a yak caravan. One day while trekking with a caravan, a yak suddenly turns on Karma. The charge is so fast, so sudden, that Karma does not have time to move nor I to shout. The yak raises its massive head under my friend's chest, lifts him from the ground, then drops him in a heap. Surely he must have been mortally gored by the sharp, curved horns. But when we strip him we find no bleeding wounds, only a huge bruise over two broken ribs. He is unconscious and appears to be in shock; I give him a shot of cortisone and ask the eldest man there what he would do. "Go see Amdgi," he says. Amdgi is the healer.

A lama and shaman in every valley

Each village has its own pantheon of spirits who were adopted by Buddhists when they started spreading their faith through these mountains centuries ago. Each valley has a lama and a shaman, both skilled at reading omens to learn the best time for any task or, when an accident occurs, to discover which spirit has been offended. The next morning we carry Karma back down the mountain.

We cannot go forward before learning the cause of this accident and atoning for it. Lakpa and Karma are not alone in this resolve. Having lived long enough in this merciless steppeland, I respect the supernatural and bow before the strange influence of mountain divinities. Life is so fragile that after a while you feel very vulnerable, and the spirits come to life for you.

We are fortunate that Tulku-Tshewang, the precious reincarnated Lama of Naphakuna, is just then passing through the area. At our request, he pauses in his pilgrimage to Mt. Kailas. To discover the cause of our misfortune, we offer him a brick of tea and a sum of money that Karma and Lakpa would be happy to earn in a month. After some meditation, the holy man shakes two dice in a closed box and opens the box to read them. Led by the numbers they show, he consults an ancient book and says, "A *lu* [earth spirit] is

Through the morning mist outside Saldang village, a young man brings yaks down from the high pasture.

Local shepherds watch the animals during the spring; in summer, the yaks carry trade goods up to Tibet.

Chores at Charkha include spinning wool, churning milk into butter in yak-leather bag. The women wear typical garb: a *chuba*, or sleeveless tunic, over wool pants; woven apron; *suebas*, traditional boots.

offended by a dispute that you had in the low country." Indeed, before leaving Jumla months ago, Karma and I had argued—over what, neither of us can remember. In an angry gesture, he had knocked over some cups containing sacred water on the altar in our room.

Only one rite will exorcise the vengeful spirit and make it safe to take to the road again. The lama chooses a date—two days hence—and with part of the goods we gave him begins to make little cakes in batches of 108, the number of sacred books in Tibetan Buddhist scripture, the number of beads in a prayer necklace, the number of braids in a woman's traditional hairdo. In addition, he makes three *tormas*, dough effigies of Karma, Lakpa and me, to which we add spit and fibers pinched from our clothes.

Tulku-Tshewang and two helpers intone sacred texts to the sound of mysterious rhythms being hummed. The scent of juniper fills the room; as night falls, butter-fueled lamps shed their tiny brightness. They illuminate the three statues enough to fool the *lu*, who follows when they are carried outside on a tray. Our *tormas* are then thrown down the gorge and we are free again. (Had we been nobles as recently as the early part of this century, we are told, a man would have played the part of the effigy. Wearing the possessed person's clothes and riding his horse, he would have traveled away from the place, taking the demon with him and never returning home.)

Nothing save meditation is accomplished alone in Dolpo. When villagers agree that a log bridge must be rebuilt across one of the little rivers that can become torrents in the summer, it is a communal project. A man of means contributes a log that has been carried from the forest around Tso. Men of lesser assets who will benefit from the span give their labor. When spring reveals damage to trails serving a town, the trails are renewed in the memory of a lama or a popular villager. Prayer walls are often raised the same way—rebuilt in an act of devotion by all the folk of a hamlet from stones painstakingly carved with the sacred Buddhist mantra, *Om Mani-Padme Hūm*, "The jewel in the lotus flower."

Harvesttime is perhaps the most communal of all. As the stone-fenced fields of barley ripen, farmers reap the crop with sickles and lay it out in sheaves to dry. The barley is prepared handful by handful as workers

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twist the tops of the stalks from the straw. Then the threshing begins as beaters face each other, the women in one row, men in the other. Singing to set the rhythm, each row of beaters wields wooden flails against the heads of barley on the hard-packed ground. A woman with a basket tosses threshed barley in the air; the chaff blows away and the seeds fall. As the beaters tire, their song slows; it picks up as they revive.

Many individuals trade their labor, working neighbors' fields in return for help on their own. Those who own no land hire themselves out, while the most land-rich men pay laborers with food, measures of grain, or the use of a yak and plow the following spring.

The universal work of bringing in the crops is as hard and happy in Dolpo as anywhere. A good harvest means the people will prosper, and they labor with a will, sweating and singing through hot and dusty toil. When all of a village's crops are in, the day ends with celebration. The people break out bowls of barley beer and five-string lutes. Night falls to find dry-sounding lutes being passed from hand to hand. At the village of Shimen, we danced in a circle around the fire and everyone joined in, my friends delighting that as the tempo quickened my feet tangled more and more until I collapsed in the grass and slept.

Although some Dolpo-pas migrate south for the winter months, the villages remain occupied year-round. In late fall, most of the yaks are sent south with trading caravans. When winter comes, bringing snow and violent local winds, most people stay home. The women weave wool, while the men tailor blankets and clothing. Many of the men also spend time in residence at the monasteries, performing ceremonies.

The next winter Tshewang came to Kathmandu and we explored the valley he had not seen before. Just as he had seen me enter a different way of life, I wondered at his discovery of this Westernized city. Riding in a cab along New Road, he exclaimed, "There are as many taxis in Kathmandu as there are yaks in Dolpo!" I agreed and asked which he preferred. Pausing, he answered, "The yaks I raise myself."

The Nepalese government has decided to protect the Tso Lake area of Dolpo by making it a national park and taking steps to discourage foreigners from visiting. The express reason is that tourism too often brings cultural and ecological turmoil, a premise I cannot deny. But Dolpo still must draw strangers, like moths to a candle behind a screen. And what of the Dolpo-pas, who are equally drawn to the world outside, where the very sun seems larger?

Braving winter chill, a woman leads her son across a frozen stream; Tibetan pony was acquired by trade.

Huddled beneath improvised shelter from snow, grandmother and charge rest during migration south.

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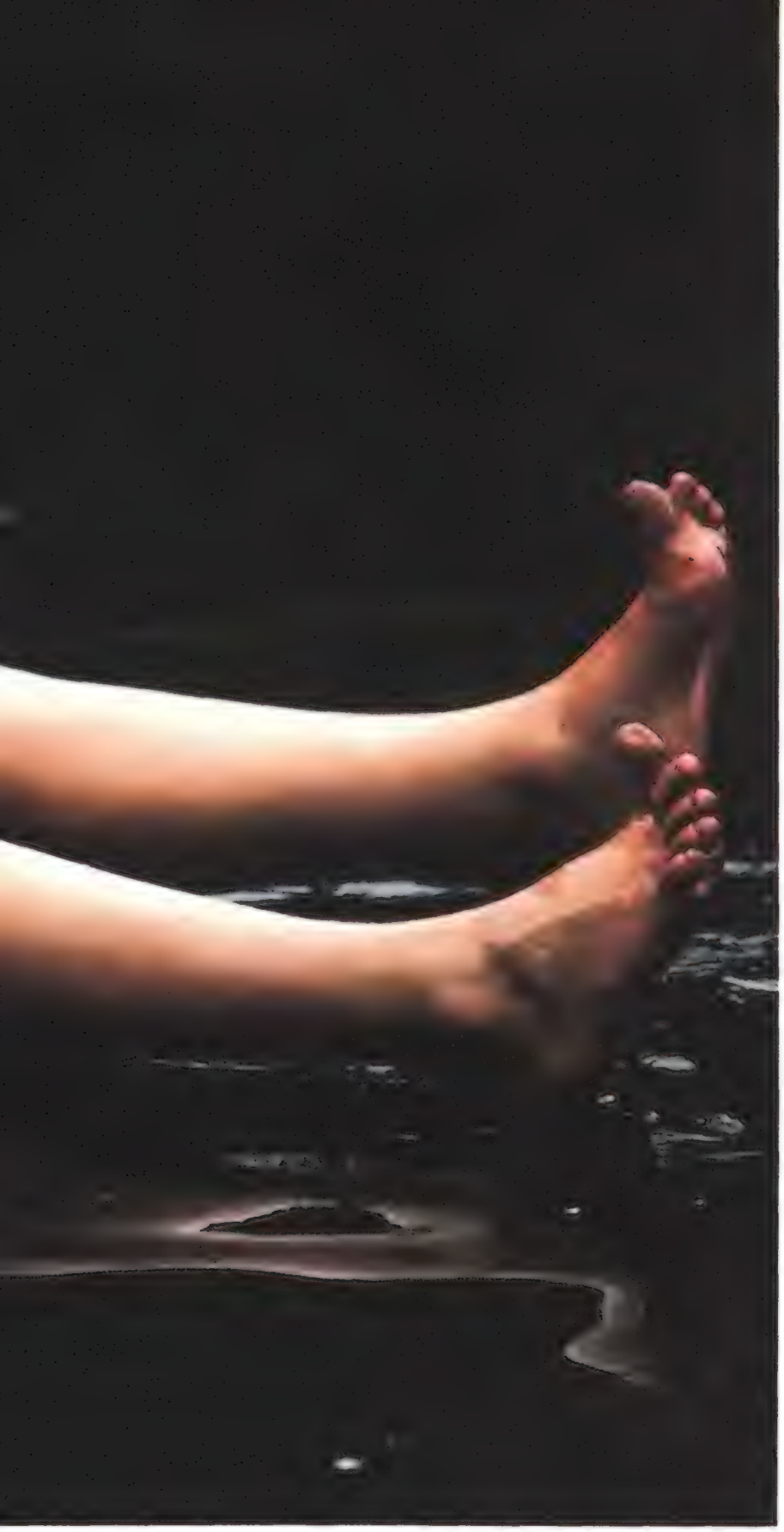
Most little piggies still go to market, but Susie stays home and splashes in the pond with Darrin Davidson.

By Stephen S. Hall

The pig's progress —out of the sty and into the swim

Swine have long been objects of derision, but lately they've acquired a certain cachet and some people even praise them as pets



Raised as a pet on a New York farm that's owned by Darrin's parents, Susie was easier to train than a dog.

Nature has played some pretty weird tricks on the pig. It has taken a brain thought to be inferior only to those of primates and dolphins, encased it in lard and made it walk on the animal equivalent of high heels. Judging this book by its outlandish cover, however, may lead us to underestimate the animal within, which is probably why nature has also painted that sly, contented grin on the faces of so many hogs. They are, it seems, elemental—of the earth. No wonder Harry Truman once declared: "No man should be allowed to be President who does not understand hogs."

That has a nice ring to it, but if we were ever to take Truman's admonition seriously, the Republic might find itself with a shortage of Presidential candidates around election time. Most people do not understand hogs at all. We think of them mainly as providers of ham, pork chops and bacon, which the vast majority of the 57 million or so swine in this country most assuredly are. But we also think of them as dirty, smelly, lazy, stupid, mean and stubborn, which the typical pig definitely is not. And there's the rub: for the pig, slander has long been a fact of life.

Expressions of swinish contempt

Perhaps no other creature on the face of the Earth has been so persistently, even gleefully misrepresented. Contempt for the pig is embedded in our language. Piggishness refers to such odious characteristics as filth and greed. A pigheaded person is perverse and willful. A pig in a poke is a bad deal. An untruthful statement is hogwash. A disorderly person goes hog-wild, a glutton is referred to as a hog, an unkempt or immoral person is a pig. Contempt for the pig is also embedded in certain religions, and in Western literature as well. The Old Testament and the Koran proscribe the eating of swine because it is unclean. Countless writers, from Horace to Victor Hugo, have taken the pig's name in vain. Even scientists who should know better have done the hapless animal a disservice. In a fit of pique over some recalcitrant laboratory hog, the great Russian physiologist Ivan Pavlov once concluded: "All pigs are hysterical."

Certainly the pig has been around long enough—about 35 million years, going all the way back to its prehistoric ancestors—to develop a well-founded nervousness about things. But in the million or so years that Man has been around, the animal has had its boosters as well as its detractors and now, by all indications, the former are finally beginning to gain the upper hand. It is no longer considered eccentric in polite society to admire a pig or even, for that matter, to love one. Pigs are being adopted as pets by people who are not content with an ordinary dog or cat, and they seem to have acquired a certain cultural cachet, as well. "Ever so gradually," writes William Hedgepeth in *The Hog Book*, "people are coming to take note of that inchoate and disturbing beatitude, often mixed with distressing hallucinations of happiness, that flows over them whenever they happen to stumble into the presence of a hog. . . . People are realizing, as one newly awakened young Manhattan executive put it, 'You can be *yourself* with a hog!' "

It's hard to say how or why this "pigmania," as one hog lover characterizes it, came about. Porky Pig, the hero of so many Warner Brothers cartoons, and Miss Piggy, the endearing diva of Muppet fame, may have

Photographs by Susan Copen Oken

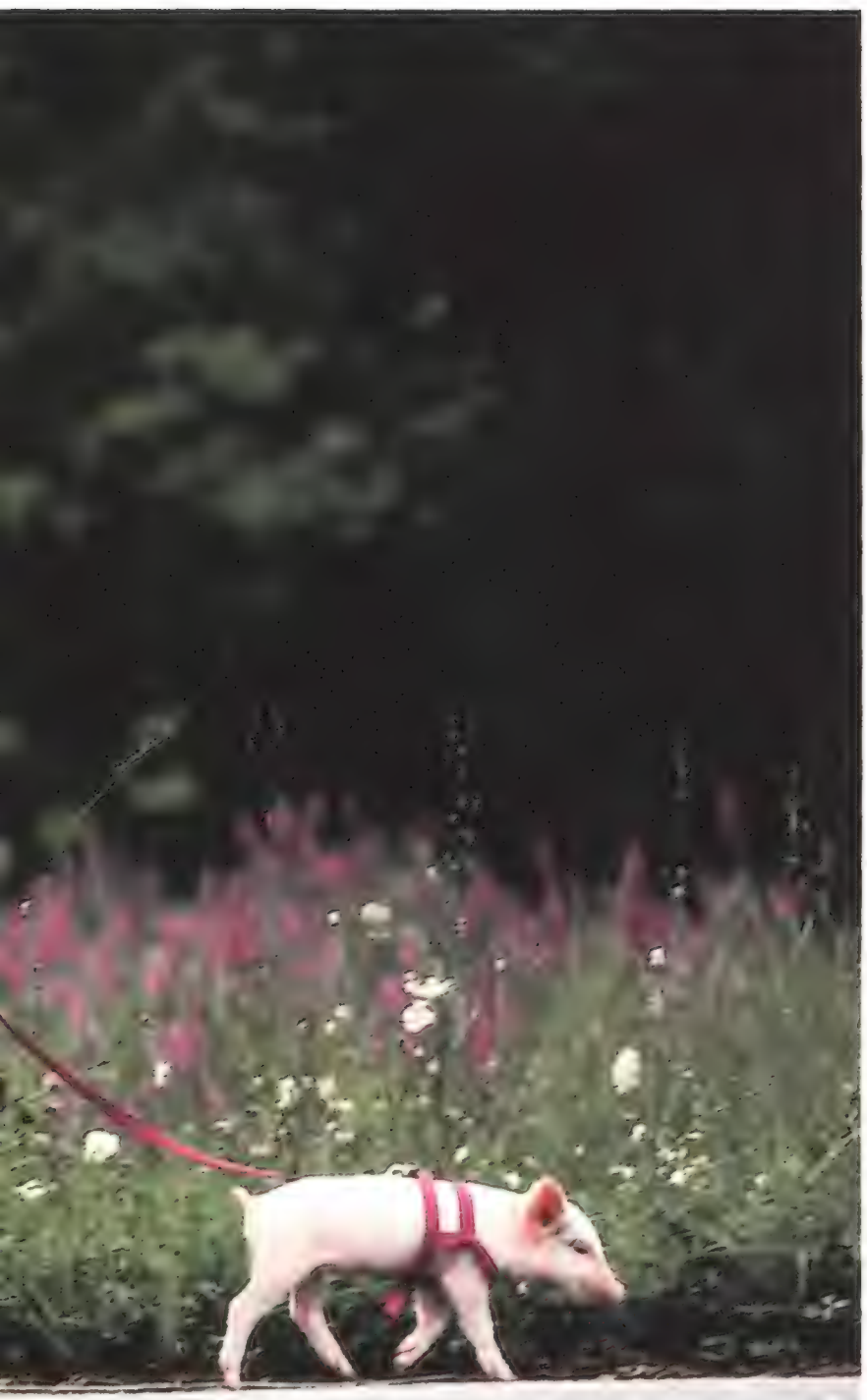
Pig named Just a Minute tackles the slide at a school in Michigan where handicapped pupils tutored it.

Susie takes Chris Davidson of Green Horizon Farm on her first outing with a leash. Initially, Susie balked.

had something to do with it. E. B. White, the author of *Charlotte's Web*, may have had something to do with it, too. His sympathetic tale about a heroic pet pig named Wilbur has captivated countless young people and their parents since its publication more than 30 years ago.

Whatever lies behind the current vogue, there is no question that pigs are turning up all over the place these days: on television and greeting cards, on oven mitts and coffee mugs, on T-shirts and bumper stickers ("Have you hugged a pig today?"). There is a National Pig Day on the calendar (March 1) and pig lovers are even starting to get organized.

A club called the Short Snout Society was formed in Greenville, South Carolina, last year to help improve the pig's public image. The group already has 500



Then she stopped squealing and commenced walking. It wasn't long before she knew how to heel and wait.

members in 22 states and five foreign countries, each of whom has submitted a $50 check with his or her "pignature" on an application blank and a completed Pig Aptitude Test (PAT). Social events include the annual Swine Ball and the Short Snout Gala, the highlight of which is a pig-kissing contest. "We think pigs are splendid," says club founder Jack Tate, a Greenville businessman. "They need love and affection and we don't think they're getting their share."

Some pigs are getting more than their share. They are the ones that are being pampered as pets. Nobody keeps statistics on such things, but there are probably a lot more pet pigs out there than most people realize. Back in the heyday of the general family farm, explains Dixon Hubbard, an official with the U.S. Department of Agriculture, youngsters routinely made pets out of young lambs, pigs and other barnyard animals until they grew up and became marketable or unmanageable. Although the family farm has suffered a sharp decline in recent years, the number of city and suburban dwellers migrating out into the countryside has increased. Many of these rural families, Hubbard surmises, have adopted farm animals as pets and evidently more than a few of them have taken a particular liking to hogs. But pet pigs are also showing up in towns and suburbs (where local laws permit), and occasionally even in cities.

Need help? Call a pig

Writer Kent Britt raised a 225-pound minipig named Fido in his suburban Washington, D.C., backyard. Melanie Choukas-Bradley, also a writer, brought up her 650-pound pet pig, Porkchop (p. 157), on a 60-acre farm in Montgomery County, Maryland. Victoria Herberta, a 46-year-old house painter, has raised two pigs, both named Priscilla, at her home in Houston which, she says, is "practically downtown." Herberta taught her animals how to swim and last year one of them was presented with an American Humane Association award for heroism after it saved an 11-year-old retarded boy from drowning in a lake.

Dr. Raymond Sattler was a youngster in California the first time he saw a pig. He decided then and there that he was going to be a pig farmer when he grew up. He got sidetracked into neurosurgery instead, but he and his wife, Deborah, have filled their home in Lumberton, North Carolina, with pig memorabilia, and last year Sattler was given a ten-day-old Duroc piglet for his birthday. Norma Jean, as the pig is known, weighs more than 500 pounds now and may eventually exceed 1,000. Despite her considerable bulk, Sattler says, she is a benign and companionable pet. She watches television, goes swimming, digs clams and eats whatever her owners eat, which, on outings to the beach, often includes hors d'oeuvres, lobster and champagne. Norma Jean is not required to stay outside, as is the case with many pet pigs. She lives right in the house, and now that she has outgrown her room the Sattlers are moving to larger quarters. "She's just as smart and loving as a big old dog," Sattler says, "and we intend to keep her as long as she lives."

Chris and Kelly Jones, ages 13 and 12 respectively, take a somewhat more traditional approach to pigs. Most summers, they raise four or five of them as a 4-H project on their parents' ten-acre farm near Hyde Park, New York. The Dutchess County 4-H Porkers Club, to

Stephen Hall wrote about boomerangs and inventors in the June and August 1984 issues of SMITHSONIAN. *He resides, pigless, in a Manhattan studio apartment.*

At a lawn party for their pigs, Chris (left) and Kelly Jones model noses while a guest hogs their tablecloth.

which the youngsters belong, discourages members from naming pigs or getting too close because at summer's end they are auctioned off for market at the county fair. It's hard, though, when you spend every day with your pigs, not to treat them like pets. And so the Jones brothers baby their animals, take them for walks, play music for them and sometimes treat them to parties (above). "When the summer is over," says the boys' mother, Carol, "we remember them by the special feelings we shared for a while."

People who are fond of pigs—pork producers as well as pet owners—allege that the animals can communicate verbally, solve problems by themselves and display emotions ranging from affection to anger. To know a pig, they say, is to love one. But sometimes it does take a lot of patience.

Despite its reputed lazy demeanor, the pig's worldview is defined by curiosity, and its explorations tend to be three-dimensional and, if anything, excessively industrious. The great obsession is rooting, nosing about in the soil for whatever may lie beneath another inch or two of dirt—tubers, worms, China. The awe and excitement of a hefty Hampshire as it espies a virgin tract of land, particularly in the springtime, may be likened to Balboa's reaction when first he glimpsed the Pacific. And the ensuing grunt of contentment may be likened to a large body of water emptying through a drain. Once loosed on unspoiled terrain, pigs will methodically excavate until, in the words of one veteran observer, "it looks like a World War I battlefield, trenches and all."

Hogs like dirt, but they are not enamored of mud and they don't "sweat like a pig." These two points are allied by common misconception. Pigs have only a few sweat glands; those vents at the tips of their snouts are for salivating. In order to cool off in hot weather, they seek relief in a slick of mud or pool of water. Fishermen on the Westfield River in the Massachusetts Berkshires have seen an extreme example of this tendency. A 1,200-pound, hippolike mass of pink flesh, unrelated to the trout family and answering to the name of Susie, was known to recline in the shallows there on hot days. Pigs without a private Riviera may try to immerse their bulk—"rather pathetically," writes an academic—in a small dish of water.

Relatively speaking, pigs are pretty clean. People marvel at how rarely they foul their own nests: the little material that makes it all the way through their 75 feet of intestines is neatly deposited at the point farthest from eating and sleeping spots in the pen or kitchen. Kitchen? Well, the Davidson family of Green Horizon Farm in upstate New York learned this firsthand two summers ago when they simultaneously raised a puppy named Chief and a barely four-week-old piglet named Susie (below). The pig paper-trained in three days. Two weeks later, Chief was still trying to get the hang of it.

Pigs talk, of course. A journalist snooping around Fred Sepe's Misty Meadow Hog Farm in Romulus, New York, not long ago watched a whole barnyard shift mood in two minutes flat after a boar was released. (A boar is a male used for breeding.) It began as hog murmur, pig rustle. The big Yorkshire, once out of the pen (though still in a larger pen), began to trot up and down a line of enclosures holding four other boars and maybe 60 sows. Amid much jostling and bumping, the other boars thrust their snouts up to the fence and worked their jaws and made dark pig mutterings until finally their mouths were white

Susie cavorts with a playful puppy named Chief. They were raised together and soon became fast friends.

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Another pet pig called Susie dwarfs owner Roberta Cowell as the two of them amble down Main Street in Cummington, Massachusetts. Raised by Mrs. Cowell's late husband, this Susie grew to about 1,200 pounds.

with foam. There was a damp electricity in the air.

The liberated boar, meanwhile, stopped in front of each pen and smeared his foamy mouth against the eager snouts of grunting sows. There was a great spirit of democracy, even civility, in the way the animal trotted up and down the line, parceling out this foam: it looked like a politician making sure to shake every hand at a factory gate. The other inmates responded with great expectant tumult.

Long after Sepe corralled the boar, the sows—obsessed with boar spittle, which contains a sexually arousing pheromone—brushed their snouts on the fence. With pigs milling about, sounding for all the world like a baseball crowd after a big play, the exchange of information—chemical, visual, aural, physical—was almost palpable.

Pigs can communicate with people, too. Or at least some people think they can. Raymond Sattler says that Norma Jean makes the usual pig sounds—grunts, snorts and whines—but that some of them have come to be associated with certain situations. After a good night's rest, her standard greeting is a short, sleepy grunt which Sattler interprets as, "Good morning." When her owners take her out for a stroll on her leash, Norma Jean emits a squeal which means, Sattler says, "that she is happy to be taking a walk." She huffs when she is agitated and she makes a "pig bark" whenever she notices that something unusual is happening.

It may also be that pigs emulate the language of other animals. Melanie Choukas-Bradley says that Porkchop sometimes barks like a dog. She has also heard him chattering at horses, likening his discourse to a combination of a grunt and a squeal and a kind of heavy breathing. "I'm convinced," she says, "that if pigs had digits like primates, they could be taught to talk in sign language."

It is not surprising that people who have gone to the trouble of raising pigs as pets are quick to praise their qualities in such human terms as intelligence, affection and self-control. But they do not always agree. "Self-control?" yelps Kent Britt. "I wouldn't go that far. They're pretty pigheaded. Mine wanted into my condiment cabinet. I put a bolt lock on the door, but he figured out how to open that, so I'd come home and find ketchup all over the floor. It's been said that happiness to a dog is what lies behind a door, but I think it's even more true of pigs."

The unfortunate demise of Britt's pet, Fido, may shed further light on pig humors. When Britt moved to a town house several years ago, he transferred Fido to a family farm. But the pig died fairly soon after, and it was assumed that the cause of death was a common affliction of pigs: stress. "He suddenly discovered that he wasn't a dog or a human, but a pig that had to fight for a place in the pecking order," Britt believes. "One supposes—but there's absolutely no proof—that the

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A BLENDING OF ART AND MACHINE

Kelly Jones practices scales on his French horn while an apparently appreciative pig pays close attention.

cause of death was homesickness, a broken heart."

Susie, the 1,200-pound heroine of Cummington, Massachusetts, was just the opposite: a brokenhearted survivor. Stanley Cowell and his wife, Roberta, took Susie into their home in 1975 after she and her seven littermates had been rejected by their mother. She would occasionally plod down Cummington's Main Street on walks, controlled only by a thin switch.

Susie grew to associate the sound of Stanley's truck with the arrival of a fresh consignment of candy bars, orange soda and doughnuts. After he died a few years ago, she continued to rustle herself out of her barnyard lair and search forlornly for her "father" whenever the truck engine kicked over. "We knew she was looking for Stanley," says Roberta. Susie died of a heart attack in 1983.

Swine can live to be 12 or 15 years old but the vast majority never see past seven months. That's about how long it takes to turn a tiny piglet into a 230-pound hog that is ready for market. In American agricultural semantics, 110 pounds is the continental weight divide between "pigs" and "hogs."

To stare into the eyes of a four-month-old pig destined for the slaughterhouse is to peer deep into the pacific recesses of the most existential creature in the animal kingdom. These pigs *know*. Yet they choose to live out their days with dignity and equanimity. Perhaps that is why, in Chinese astrology, the pig personality is known for living for the moment and "does not like to look too far beyond tomorrow."

Being a pig is no box of chocolates. Within days of birth, life becomes a constant physical ordeal: someone clips your needle teeth (as a safety precaution) and snips off your tail (pigs often devour each other's tails). Notches are cut in the ears for identification, and the unlucky males who don't pass muster as potential boars are surgically rendered into barrows, the castrati of hogdom.

A hog raised for market may spend most of its lifetime in confinement. It moves from farrowing stall to nursery pen to growing pen to finishing pen. The old-fashioned pigpen, or sty, is so outdated that Fred Sepe built one on his farm as a kind of museum piece to show visitors.

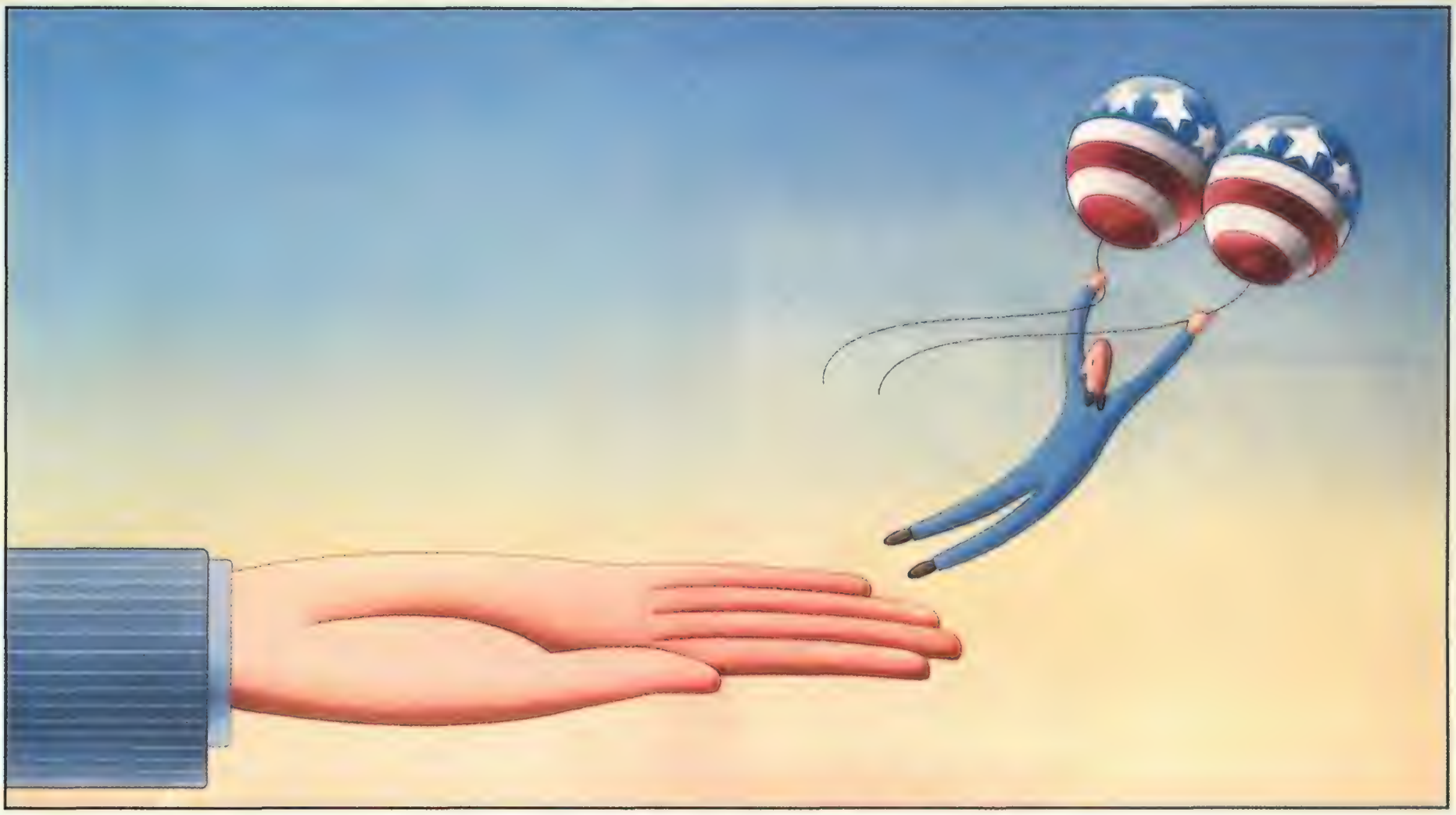
There are more than 85 breeds of domestic swine. Some minor eastern European breeds sound like Soviet automobiles: Livny, Urzhum, Turopolje, Mirgorod and Dermantsi Pied. From Portugal comes the Bisaro. American farmers traffick primarily in eight breeds—Hampshire, Yorkshire, Duroc, Landrace, Poland China, Spot, Chester White and Berkshire—but cross-breeding is so commonplace these days that purebreds are seldom seen.

Pigs eat everything from soup to nuts and their affinity for truffles is cleverly exploited in France, where they are used to sniff out the prized fungi. Pigs raised for market are nourished primarily on a diet of fortified grains—usually corn and soybean meal. Some pigs are also fed alfalfa, clover and other pasture crops. Pet pigs evidently can get by on a diet that may consist of everything from cheeseburgers and chicken to vegetables and desserts. But although pigs are omnivorous, they are not indiscriminate. In one famous test, the subjects once refused 171 out of 243 proffered vegetables. Melanie Choukas-Bradley reports that Porkchop will plow through a tomato-and-zucchini stew in no time, but delicately sets aside unwanted mushrooms and carrots.

The pig's contributions to Man

People and pigs have similar digestive, cardiovascular and respiratory systems and are susceptible to many of the same types of diseases, including ulcers, heart disease, cancer and obesity. This makes pigs ideal models for biomedical research. For decades, a near human form of insulin from pigs has kept diabetics alive. Pigskin has been used in treating severe burn cases, and thousands of patients suffering from heart disease have enjoyed prolonged lives thanks to the implantation of new heart valves taken from pigs.

Some years ago, pigs were involved in a fascinating study at the University of Missouri which helped confirm the fact that babies born to alcoholic mothers can suffer withdrawal symptoms. It also demonstrated that pigs, like humans, are susceptible to alcoholism. In one test, a number of pigs were given unlimited access to an alcoholic beverage. The dominant member of



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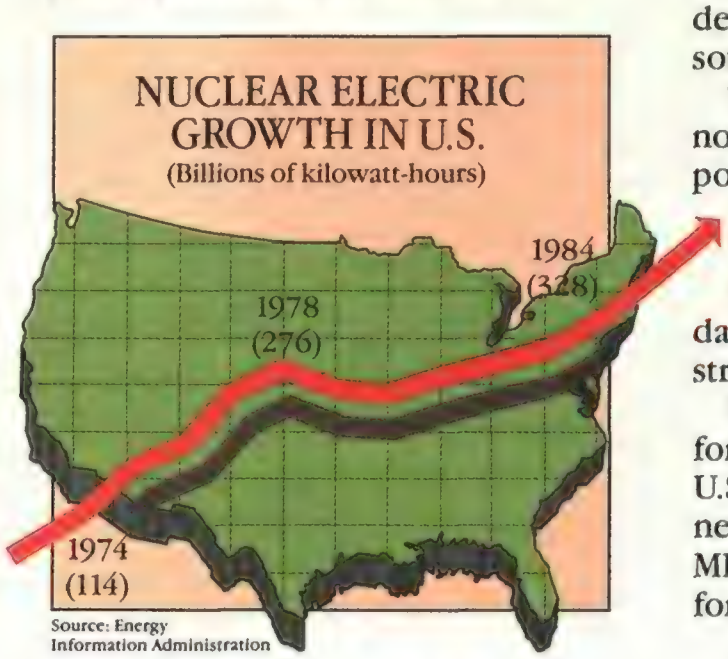

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U.S. COMMITTEE FOR ENERGY AWARENESS

Not a pet but a commercial producer, mother nurses seven piglets at a breeding farm in Massachusetts.

the group drank to excess and lost his choice sleeping spot to an abstemious companion as a result. But then, like a sinner who has suddenly seen the light, he voluntarily went on the wagon and regained his turf.

More recently, several dozen jogging pigs gave their all for science in an unusual health experiment at Arizona State University. The animals were required to run nearly a mile around an oval track every morning. Different pigs were put on different diets, and at the end of five months all of them were slaughtered for laboratory analysis. The results indicated that a well-balanced diet is more important than moderate exercise when it comes to preventing heart disease.

Early on in that study, it became apparent that the pigs were no more enthusiastic about running laps than the average person is. Consequently, George Seperich, an assistant professor at agriculture, and his graduate students had to prod the bulky creatures around the track. But that wasn't the hardest part of the project. The hardest part, according to Seperich, was "finding 108 matching pairs of sneakers."

While life as a laboratory pig may leave something to be desired, living well is the best revenge for pets like the Susies, Norma Jean and Porkchop. Yet even their lavish comforts pale in comparison with the excesses indulged in by a decadent pig named Albert back in the 1920s. He belonged to Josephine Baker, an exotic young black dancer and singer from America who caused a sensation in Paris with her risqué costumes, extravagant nightclub acts and flamboyant behavior. Albert, named in honor of the maitre d' of the Hôtel Fournet, shared a three-room suite with Miss Baker. He periodically got doused in Worth perfume. He dined on rooster combs and champagne. Later on, as a permanent denizen of the kitchen in his owner's Café Joséphine, he indulged so heartily in rich cuisine that his expanding bulk ruptured some boiler pipes.

There have been other prominent pigs in history. Pigs dressed in pantaloons and trained to dance to bagpipe music were enlisted in an attempt to dispel the melancholy of France's Louis XI. In the 19th century, an English nobleman used a pig as a pointer when he went hunting for birds and rabbits. Under more scientific circumstances, a pig known only as Number 311 jumped from a sinking ship during an A-bomb test near Bikini Atoll in 1946. It was one of 3,000 animals that were used to study the effects of the bomb. Fished out of the "hot" water, it grew to 500 pounds and lived out its government pension at the National Zoo. No list of famous pigs would be complete without mention of Arnold, the Chester White of the *Green Acres* television series who won acting awards, learned to sip soda through a straw and got to rub hocks with Eva Gabor.

It's true that hogs, like the rest of us, have their shortcomings and peccadilloes. They are sedentary and unathletic. They have a sweet tooth and hit the sauce a little heavily sometimes. Often it seems as if their only purpose in life is to convert every three pounds of food they eat into one pound of flesh. But the fact remains that pigs are special, and it is gratifying for those who like them to see that they are finally beginning to command the respect they deserve.

The word "respect" does not adequately convey how some members of the Short Snout Society feel about pigs. When Jack Tate recalls the club's first mascot, Magnolia, there is a catch in his voice and a tear in his eye. Magnolia was quartered behind a trailer on a farm outside of Greenville until she started eating chickens. After the farmer threatened to butcher her, Tate and a fellow club member rescued the 275-pound animal, trucked her up a mountaintop and let her go. "I do believe she's up there still," Tate drawls, "running wild and free."

The fact is that Magnolia is probably suffering from mites, ticks, worms and other discomforts that commonly afflict domestic animals let loose in the wild. But never mind about that. When it comes to pig liberation, the gesture counts more than the deed.

Pet named Porkchop grins in anticipation as owner Melanie Choukas-Bradley treats him to a melon slice.

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This "auspicious" comet was painted about 1587, illustrating a classification attributed to Ptolemy.

The swans in the foreground are associated with the goddess Venus who conquered Mars, the god of war.

Flaming allegories: artists' response to fire in the sky

Marking the return of Halley's, an exhibition tracing comets in art over the centuries has opened at the National Air and Space Museum

English caricaturist Thomas Rowlandson satirized, c. 1821, public response to a rare daylight comet.

Apparitions that hang over the world like the sword of some avenging angel, they were once portents of the births of kings and the harbingers of war, famine and pestilence. Today we speak knowingly of dirty snowballs and orbital elements, yet even now comets generate an excitement that transcends our normal interest in solar-system astronomy.

An ethereal light illuminating cosmic forces, a light as laden with allegory and symbol as any in the natural world, the pale light of pure terror: what artist could resist the challenge? Across the centuries, it would seem, few have.

Some of the best, the oddest and the funniest results have been gathered for an exhibition celebrating the comet in art, now open at the National Air and Space Museum. It will run through next April, coinciding with the reappearance of Halley's Comet in the skies of Earth. Guest curator is Roberta J. M. Olson, a professor at Wheaton College who specializes in Italian art. Her book *Fire and Ice: A History of Comets in Art* complements the exhibition.

Items in the show range from a Babylonian clay tablet to a neon sculpture commissioned this year to commemorate the reappearance of Halley's. Raphael and Giotto are here, Dürer and Blake, Kandinsky and Miró. Many are the originals; some are photographic reproductions. Not all are serious. Satirists have had their say about comet mania, as per Rowlandson's rendition, about 1821, of comet watchers (above).

Many but by no means all the works feature the most famous comet of all, Halley's. Yet even Halley's is not always spectacular, and will not be this time. Back in 1910, when it was much better situated for viewing, it was overshadowed by another comet, called 1910 I, and our collective memory sometimes confuses the two. Daniel Green, a comet expert at the Smithsonian Astrophysical Observatory, says, "If you were disappointed in comet Kohoutek in 1974, you'll be even more disappointed in Halley in 1986."

Halley's may be the most important comet of all for another reason. It marks the jump from superstition and fear to rational understanding of comets. The comet the world is waiting for is named not for the person who "discovered" it millennia ago, but for the British astronomer, explorer and cartographer who showed us that this comet is a regular visitor in a calculable orbit, a prisoner of gravity.

Our first sight of the seething tumult of the surface of a comet's nucleus may come from Giotto, a spacecraft named for the Florentine painter, which will pass within 300 miles or so of Halley's next March. And suppose that surface is a fairyland of sublimating ice jets and dusty "skyscrapers," overhanging ledges and precipitous gorges formed of ice, as Fred L. Whipple, the dean of American comet scientists, boldly speculates in his new book, *The Mystery of Comets*. Artists of the future will have an even more fantastic starting point for their imaginations.

John P. Wiley jr.

Halley's takes the place of the Star of Bethlehem in Giotto's rendition of the Adoration of the Magi, painted in about 1303-06. He almost certainly had seen the real thing in 1301. The fresco is one of a series Giotto painted in the Scrovegni Chapel in Padua.

The 1066 apparition of Halley's is commemorated in part of the Bayeux Tapestry. The inscription tells us: "They are in awe of the star." The comet was good news for William the Conqueror, bad for King Harold II of England. Contemporary accounts described it as "a flaming beam."

In the Lucerne Chronicles of Diebold Schilling, the 1456 appearance of Halley's Comet is seen not once but twice: as it appeared before and after rounding the sun. The comet was blamed for red rain, the birth of two-headed animals, and human defects, including Down's syndrome.

Samuel Scott captured the return of Halley's in 1759, vindicating prediction Edmund Halley had made in 1705. The comet is seen over the Thames, with the King's royal barge in the foreground and Westminster Abbey in distance at left. Viewers appear to be calm.

An anonymous watercolor renders the Comet of 1532, described as being three times as bright as Jupiter.

Margery Goldberg, Marty King and Linn Westbay Woloshin created this neon comet for the exhibition.

Opposite: A comet hangs over fantasy landscape in this acrylic composition by Andreas Nottebohm.

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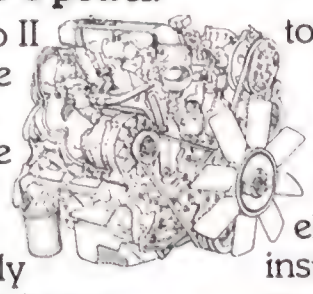

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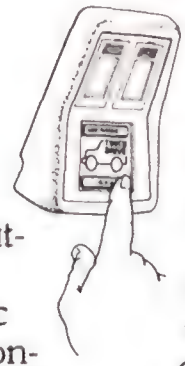

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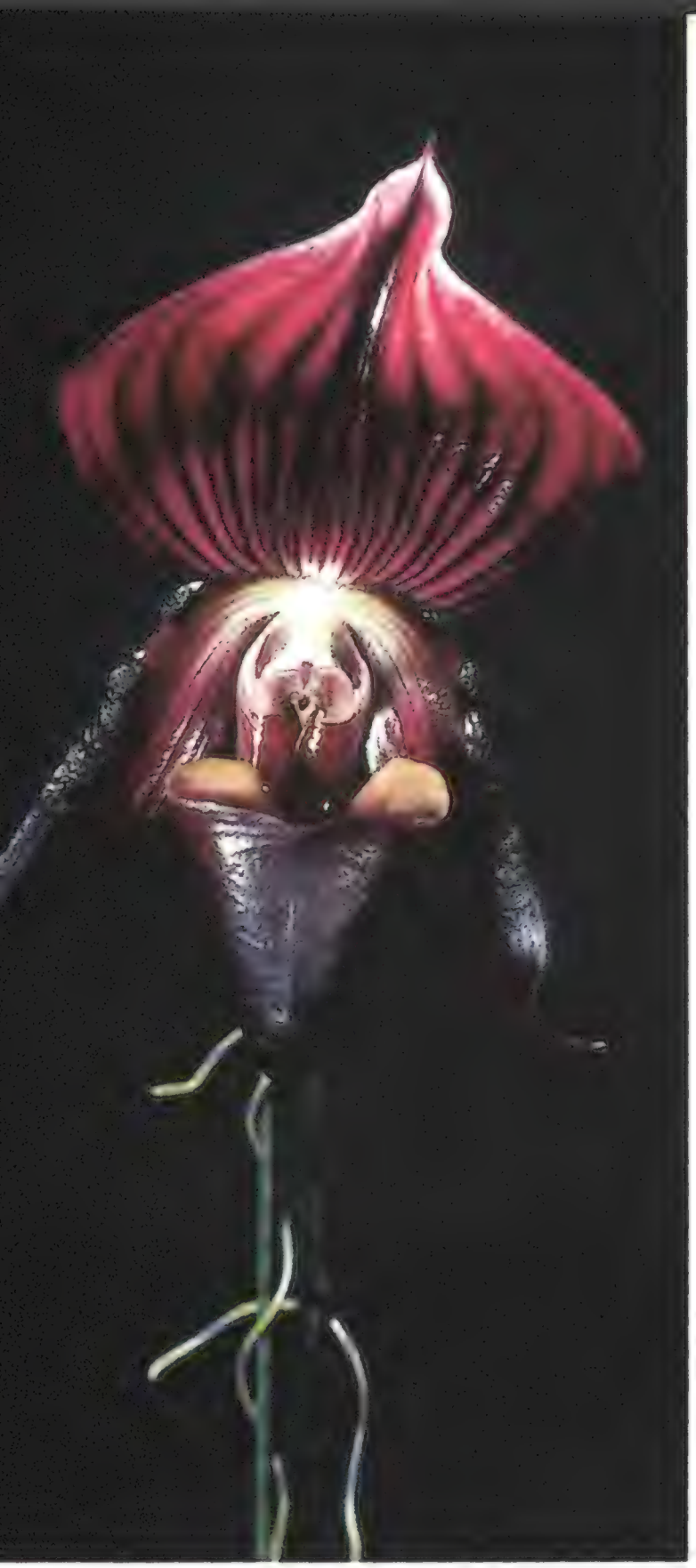


Though no true black orchid exists, Asian lady's slipper comes close.

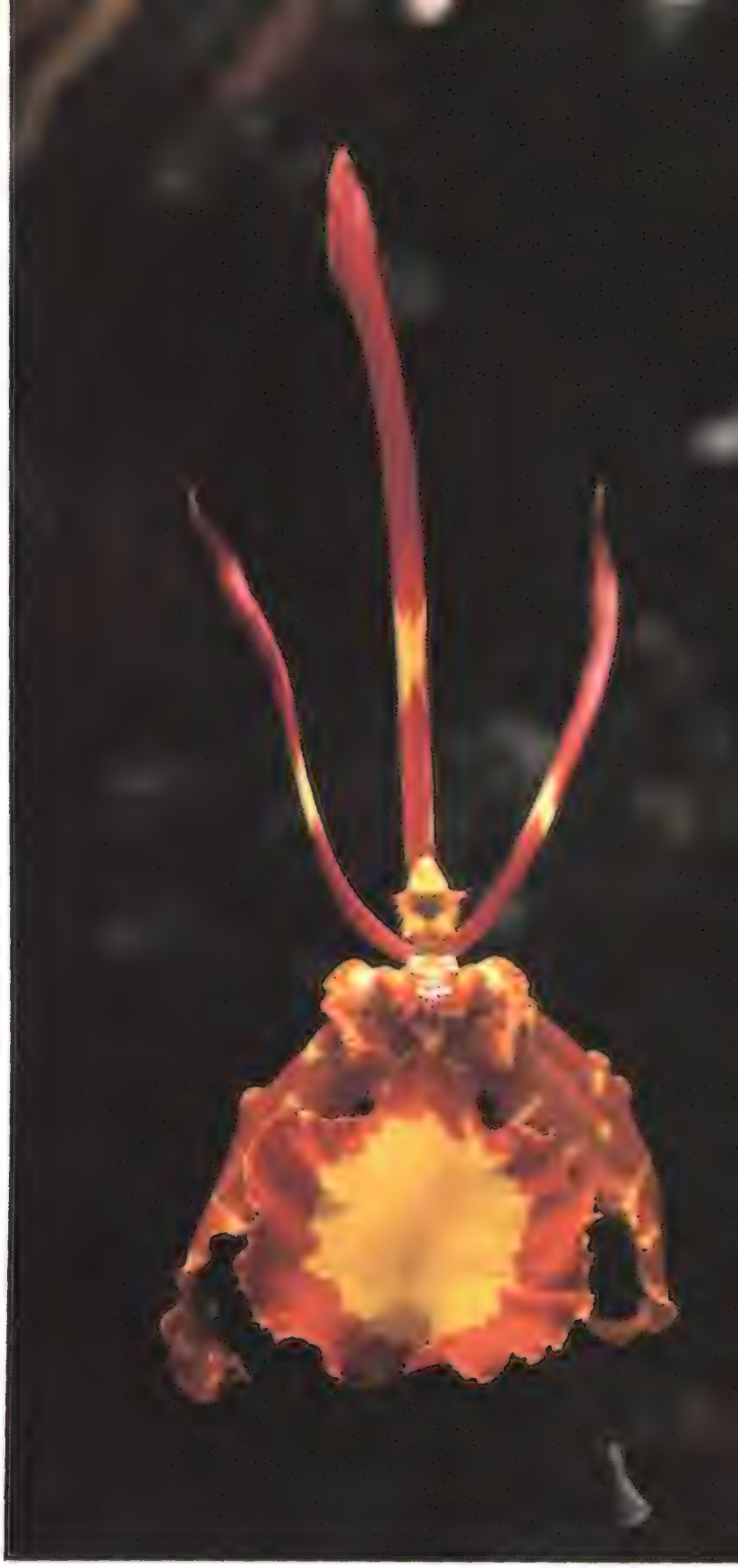
Spectacular trigeneric hybrid was produced by crossing *Sophronitis, Laelia* and *Cattleya* species.

By Ogden Tanner

The flowers that afflict us with 'a sort of madness'

Flamboyant, mysterious and complicated, orchids have always held us in their spell, but now their wilderness habitat is in trouble

Such hybrids do not occur in the wild because each species has evolved its own unique pollination system.



Butterfly orchid lures pollinators by mimicking its insect namesakes.

Orchids do strange things to people. They send sober scientists into phytological ecstasies, transform staid bankers into intrepid plant hunters, drive reasonable writers to unreasonable prose. No one knows where the fever will strike next. Movie stars grow orchids, Hollywood's status flower; so do Boston computer engineers, Connecticut pediatricians, Ohio factory workers, Florida retirees. A major, if relatively recent, convert to the faith is the Smithsonian Institution, whose orchid collection boasts more than 30,000 plants. While anyone can buy a nice windowsill phalaenopsis or cymbidium for $10 or $25, an exceptionally fine specimen of a superior new hybrid can fetch as much as $10,000 or even $25,000—a price that more than one connoisseur and commercial grower has gladly paid.

Why all the fuss? The reason, as any addict will tell you, is simply that orchids are horticulture's crown jewels: the most extravagantly beautiful, varied and sexy family of flowering plants in the world.

We'll get to the sex in a moment, but first a look at the family as a whole. For all their rare-jewel mystique, the Orchidaceae actually constitute the largest, as well as the most advanced, flower family known to science. Many experts use the figure of approximately 25,000 species, with new ones being discovered all the time. Some 80 percent or more grow in tropical

Darwin predicted that the Christmas star, with its dangling, whiplike green spur, needed as pollinator a "huge moth, with a wonderfully long proboscis."

latitudes: South and Central America, Southeast Asia and Africa; Colombia and New Guinea boast more than 3,000 species each. Orchids, however, are found on all continents except Antarctica.

The tropical species especially have astonished almost everyone who has seen them, particularly in the wild. Charles Darwin, exploring the Brazilian jungle during his voyage on the HMS *Beagle* in the 1830s, marveled at what he called the "wonderful, beautiful flowering parasites" he found growing in the trees. Like most observers of his day, Darwin at first assumed that orchids fastened onto and drew sustenance from their taller forest hosts. From his reports and others, there arose a popular misconception of orchids as sinister, leechlike, animalistic plants. The theme was gleefully developed by generations of writers, beginning with the father of science fiction, H. G. Wells. In his 1895 short story "The Flowering of the Strange Orchid," the hero, Winter-Wedderburn, is barely saved from a monstrous plant that overpowers him in his greenhouse, rendering him unconscious with its sweet stench and proceeding to envelop him with rootlets that slowly drain his blood.

The myth of carnivorous orchids

Other myths about orchids have not been entirely dispelled. Because of the predacious, traplike look of some orchid flowers, it was supposed that they devoured insects that ventured into their clutches. As late as the 1930s an orchid grower exhibiting at London's Chelsea Flower Show was approached by a well-dressed matron who demanded to see "the meat-eating orchid." The gentleman, thinking quickly, replied: "Madam, I am so sorry, it has gone to lunch."

While orchids are neither parasites nor carnivores, they are remarkable in their adaptations nevertheless. Those that grow on trees—the majority in the tropics—are classified as epiphytes, using their hosts merely for anchorage; they draw moisture from the air, and nourishment from organic matter dissolved in rainwater and from decayed matter that becomes trapped in their rootlets and crevices in the bark. Scientists speculate that by going airborne, orchids have avoided the densest shade and other competitive hazards of the forest floor, got up where bird and insect pollinators can more readily find them and, finally, obtained the advantage of height to disperse more widely their masses of tiny seeds on the wind. To make up for lack of a dependable water supply, epiphytic orchids developed fattened water-storage organs called pseudobulbs between their roots and leaves. The majority of orchids in the tropics, contrary to common belief, grow not in the low, steamy jungles but at cooler elevations from 3,000 to 6,000 feet; some are found in the Andes

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Insect pollinators must be wary of orchid lures; bumblebee orchid attracts male bees to mate; bucket orchid (center) draws hapless flies to its odorous liquid-filled lip only to dunk them; the *Catasetum* (right) has a spring mechanism on its horned antennae to eject pollen-laden stipe when triggered.

as high as 14,000 feet. In temperate zones, where the forest is less dense and competition less keen, most orchids are terrestrial, growing in the ground like ordinary plants. A few species, found only in the arid regions of Australia, grow underground.

The flowers of orchids are diverse beyond belief. Those of *Platystele ornata*, from the Venezuelan cloud forest, are so tiny several would fit on the head of a pin. Some cattleya hybrids, in contrast, have huge, gaudy blooms nearly a foot across. A few plants grow so large they occasionally break off the branches on which they rest: single specimens of *Grammatophyllum speciosum*, a native of Malaysia and the Philippines, have been estimated to weigh more than a ton, producing perhaps 10,000 flowers over a blooming season of five months, as many as 3,000 out at the same time. While a few orchids blossom only briefly—the dazzling flowers of one Javanese dendrobium last a mere five or six minutes—most are remarkably long-lived, staying in bloom from several weeks to several months.

Orchids resemble, and have been named for, moths, butterflies, spiders, monkeys, swans, slippers, dancing ladies. Their scents run the gamut from ethereal to intoxicating to the foul odor of rotting meat. They come in practically every color and combination of colors imaginable, some with bizarre blotches, speckles or stripes. Despite legend, there is no true black orchid, though some come close.

Lurking behind all these exotic colors, shapes and smells is a single purpose. It is not the delectation of human observers, but the ingenious, methodical perpetuation of the species—in a word, sex. Early folk knew there was something sexy about orchids, but they got off on the wrong track. Three centuries before Christ, the Greek philosopher-botanist Theophrastus referred to native Mediterranean species as *orchis*, the Greek word for testicle, on the grounds that their subterranean tubers came in rounded pairs. Later the physician Dioscorides hypothesized that, for this reason, the plants must influence human sexuality, a notion elaborated on for the next 1,500 years. Fifteenth-century herbalists, who also called orchids *Satyria* after the lecherous woodland followers of Bacchus, fitted them neatly into the Doctrine of Signatures, which held that plants resembling parts of the human body actually affected those parts. Thus orchid tubers came to be eaten avidly to stimulate desire.

By the 19th century, however, it had become apparent that the secret weapon of the orchid was in the flower, not the root. Orchids are unique in having the most highly developed of all blossoms, in which the usual male and female reproductive organs are fused in a single structure called the column, designed so that a single pollination will fertilize hundreds of thousands, and in some cases millions, of seeds, so microscopic and light they are easily carried by the breeze. Surrounding the column are three sepals and three petals, sometimes easily recognized as such, often distorted into gorgeous, weird but always functional shapes. The most noticeable of the petals is called the labellum, or lip. It is often dramatically marked as an unmistakable landing strip to attract the specific insect

Ogden Tanner lives in Connecticut and his special interests as a free-lance writer are horticulture, conservation, natural history.

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Jones & Scully paid $10,000 for the original clone of this trigeneric hybrid that is now sold for $24.50.

The Smithsonian collection boasts a vivid red cattleya hybrid, a part of the Rudolph Pabst gift.

Phalaenopsis Career Girl is good example of recent success in creating brightly striped hybrids.

the orchid has chosen as its pollinator—and often intricately engineered to trap its visitor and process it, as on an assembly line, to ensure the job is done right.

"I never saw anything so beautiful," wrote Darwin, whose work on orchid fertilization exemplified his theory of evolution. One of his studies was of four species of *Catasetum*. He found that when an insect triggered one of its curiously horned antennae, a springlike mechanism shot the sticky pollen masses unerringly at the bee's back—or at a human experimenter's finger (p.172), his face or a window several feet away. Perhaps his most celebrated case was that of *Angraecum sesquipedale*, a Madagascar orchid with a strange, whiplike spur almost a foot long hanging behind its lip(p.170). Darwin noted that the lower inch and a half of the spur was filled with nectar and guessed that the only agent capable of pollinating the orchid had to be "some huge moth, with a wonderfully long proboscis" at least ten inches in length. While many entomologists of the day ridiculed the idea, 40 years later just such a moth was discovered on the island.

The irresistible lure of scents

To lure their pollinators from afar, orchids use appropriately intriguing shapes, colors and scents. At least 50 different aromatic compounds have been analyzed in the orchid family, each blended to attract one, or at most a few, species of insects or birds. Some orchids even change their scents to interest different clients at different times.

Once the right insect has been attracted, some orchids present all sorts of one-way obstacle courses and Rube Goldberg contraptions to make sure it does not leave until pollen has been accurately placed or removed. Because many bees are abrupt and bumbling in their movements, some orchids offer drugged tidbits on their petals to slow them down and/or dump them unceremoniously into a pool of water in a bucket-shaped lip (p.172); one species simply encloses them for up to an hour and a half until they calm down. Once subdued, the victim gratefully, if groggily, crawls out through the only available exit—a narrow tunnel of love where the pollen is almost surgically grafted on.

Orchids sometimes resort to elaborate mimicry in order to fool insects into doing their will. Some oncidium flowers, when they wave in the breeze, so closely resemble flying insects that male bees defending their territories strike at the blossoms, receiving wads of pollen on their faces—which they obligingly transfer to other flowers when they attack again. Members of the ophrys genus go the oncidiums one better. Their flowers look exactly like the bodies of female wasps, complete with shiny eye spots, antennae, wings and hairs. Summoned by an odor—it has been de-

scribed as smelling even more like the female than the female does—male wasps of the species home in on the flowers and enthusiastically mate with them (a phenomenon delicately known to science as "pseudocopulation," though the males don't seem to mind). In the process, of course, they come away not only with a fond look in their eye but covered with pollen destined for the next bloom they manage to grab.

The preservation of the species

By such ingenious adaptations to specific pollinators, orchids—which are more promiscuously interfertile than most plants—have avoided the hazards of rampant crossbreeding in the wild, assuring the survival of species as discrete identities. At the same time they have made themselves irresistible to collectors.

The first tropical orchid to bloom in an English collector's possession, *Bletia verecunda*, was sent to an enthusiast named Peter Collinson from the Bahamas in 1731; later in the century other species were brought as novelties by explorers and sea captains, including James Cook and the celebrated William Bligh. The widespread mania for orchids, however, did not start until 1818 when William Cattley, an importer and amateur horticulturist, became intrigued by some bulbous stems that had been used as packing material in a shipment of other tropical plants. As an experiment, he potted up some of them for his greenhouse, and in November of that year was rewarded by the unfolding of a spectacular lavender flower with purple markings and a beautifully ruffled lip—the founding queen of a dynasty of "corsage orchids" that have appeared at junior proms and company banquets ever since. Named *Cattleya labiata autumnalis* by John Lindley, England's famous botanist, it created an immediate sensation, inspiring wealthy collectors and commercial nurserymen to send professional plant hunters scurrying off to the tropics in search of more.

For the better part of the next hundred years, those hunters combed the jungles and peaks of South and Central America, Africa, India, Malaysia and the Philippines, risking countless dangers and hardships in order to ship back vast quantities of plants—which often sold for incredible prices in the auction houses of London, and later Paris and New York. In the process, entire forests were stripped: one hunter figured that, on an average, 10,000 trees had to be cut down to obtain 4,000 usable orchids, and in 1878 an importer announced with some pride the arrival in England of two consignments totaling no less than two million plants. "This is no longer collecting; it is wanton robbery!" protested a leading botanist, but few listened.

To outwit their competitors, the professional gather-

Award-winning *Brassocattleya* has a flat, round face with overlapping petals and sepals judges look for.

Original hybrid of sunset-colored cattleya cost $25,000 but mericlones can now be bought for $24.50.

The orchid craze in England started in 1818 when a close relative of this *Cattleya labiata* first bloomed.

Miniature orchids, because of inconspicuous blossoms and small size, are vulnerable to habitat destruction.

Phalaenopsis surround Smithsonian horticulture director Buckler, greenhouse manager Andy Dietz.

ers traveled with great secrecy, sometimes removed all traces of valuable species from their habitats, forged maps to throw off rivals and resorted to other increasingly dirty tricks (the dirtiest, it was reported, was to casually urinate on a competitor's dry, dormant plants as they awaited shipment on the dock, causing them to "bolt" during the long sea voyage home and thus arrive in a useless mess).

Among many orchid importers, the acknowledged king was a German-born nurseryman named Frederick Sander, who by the 1880s had 60 large greenhouses for his trophies in St. Albans, England, and employed 23 collectors in the field at once. Of these the most intrepid, admired even by his fiercest rivals, was an imposing, self-assured Czech named Benedict Roezl, who was even more conspicuous for the iron hook he wore in place of his left hand, severed in an accident.

Roezl was legendary not only for his unusually fat shipments—one from Central and South America weighed eight tons—but for the mystifying speed with which he was able to travel back and forth across the Americas for the prize species he alone seemed to know just where to find. He was robbed at least 17 times,

Visitors can enjoy the orchid collections displayed in public exhibition areas in Institution's museums.

though because he traveled austerely he never lost a great deal. The big Czech lived long enough to discover about 800 new species of flowering plants, including the orchid genus *Roezliella*, and to retire with honor in his native city of Prague, where a statue of him still stands—with an orchid in his hand.

Not every hunter was so lucky. Roezl's nephew Klaboch was killed in Mexico. Many just disappeared, including one who vanished mysteriously in Madagascar. Some years later another agent came upon the lost traveler—comfortably ensconced in a native village, married to the chief's daughter. "If I hadn't agreed to do it," he explained to his surprised visitor with a smile, "they'd have eaten me alive." It is said that he later escaped.

If survival was a problem for the orchid hunters, it was a supreme challenge for the plants. By the time they had been crated and packed out of the forest, waited for weeks on a dock for a ship to arrive, then were subjected to voyages of months in dark, damp holds, it is little wonder that on arrival four out of five were dead. Those still showing signs of life were eagerly snapped up by collectors, only to be killed off in large measure by the standard treatment accorded all "jungle" plants in those days: they were invariably grown in stifling greenhouses heated by coal or wood stoves, with no ventilation and frequent drenchings with buckets of water to create a suitably steamy atmosphere. It was not until Joseph Paxton, the Duke of Devonshire's head gardener, began opening up his "stove houses" in 1835 that tropical orchids were finally able to experience light and air.

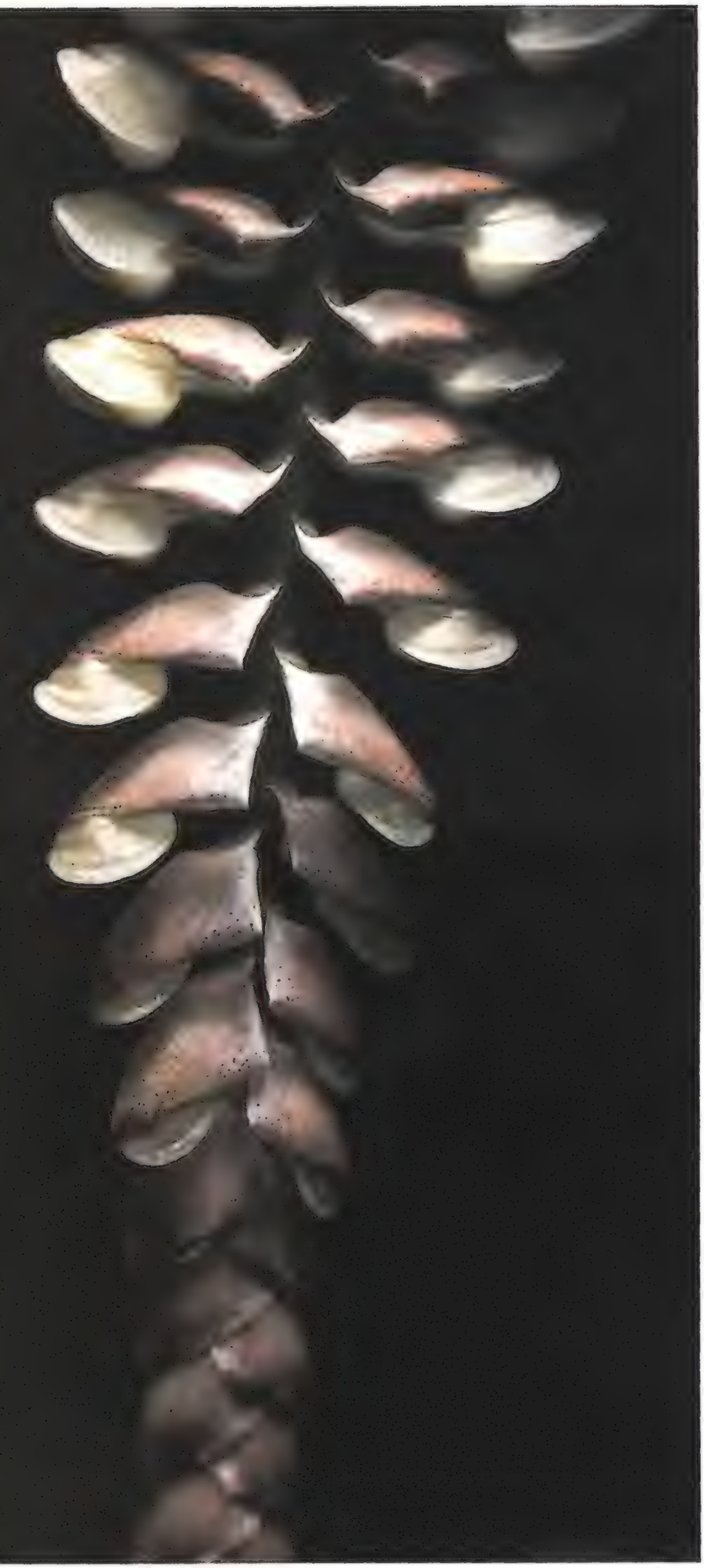
The success story of hybrids

Other advances gradually followed. John Dominy of the orchid nursery of Veitch created the first successful man-made hybrid orchid by crossing two species of calanthe, bringing *Calanthe* Dominy to flower in 1856. Since then, untold millions of hybridizing attempts have been made by professionals and amateurs, seeking ever more exotic, or perfect, combinations of shape, color and scent. Orchids today boast more named hybrids than any other family of plants: the official registry, maintained by the Royal Horticultural Society of England, now totals at least 100,000.

For a long time, growers had trouble raising new plants reliably from seed: while a single capsule of certain cattleya species may contain as many as five million seeds, only a few of them find their way to a suitable germinating spot, and then are so lacking in food reserves they must coexist with a specific fungus in order to obtain nourishment (if it were not for this balancing act of nature, orchids would long ago have blanketed the Earth, wall-to-wall). In 1922 Lewis Knudson, a Cornell plant physiologist, proved that the only function of the fungus was to manufacture sugars that the seed could use; he came up with a new growing medium of sugar and mineral nutrients in an agar jelly. When sowed with seeds and isolated in sterile, stoppered flasks, the concoction revolutionized orchid culture by making plant production possible.

In the 1960s Georges Morel, a French chemist, took an equally revolutionary step. He found that by cutting pieces out of the growing cells at the tip, or meristem, of a new shoot, he could reproduce any orchid endlessly, obtaining exact copies each time. These "mericlones" not only matured faster than seedlings but could be used to replicate outstanding hybrids. Today, meristemming reproduces thousands of valuable new hybrids at reasonable prices.

Orchids are big business these days. Major cut-flower growers like Gallup & Stribling and Rod McLellan in California each ship more than a million blooms annually, computerizing and controlling production so as to have the most popular types ready for Easter, Mother's Day, Christmas and June weddings. Leading shippers of live plants, like Jones & Scully of Miami,



This ten-inch spray of the rattlesnake orchid clearly illustrates the reason it was given its common name.

sell as many as half a million each year to hobbyists.

What are the favorites? "Orchids are as trendy as women's fashions," says Bob Scully jr. "A while back it was all reds and yellows. Now cattleyas are back in vogue in the lavenders, pinks and whites of the old corsage orchids, as well as greens." Among the hottest items today are miniature orchids, both the small, exotic species that have come into favor with connoisseurs and the colorful hybrids like "mini-catts"—cattleyas that have been bred to produce showy blossoms, but on plants that are less than a foot high.

Orchid growing was once exclusively a rich man's sport. No more. Scully describes a high percentage of his 30,000-odd regular customers as "middle-America types, people who enjoy spending time in their homes and making them look nice." He is always on the lookout for an especially fine specimen from which to propagate a new market winner. Not long ago he paid a Miami electrician and amateur orchid grower $10,000 for one, a trigeneric hybrid that has glistening green and chartreuse flowers five inches across (p. 174). Another went for $25,000. Clones are now available to the public for a relatively modest $24.50 apiece.

While thousands of small orchid collections have sprouted in recent years, most of the great private treasure troves of yesteryear have been dispersed, either sold to commercial growers or donated to public institutions and gardens where they are now more widely enjoyed. A major beneficiary of the latter phenomenon is the Smithsonian's Office of Horticulture Orchid Collection. With close to 2,500 species, it is well on its way to becoming one of the finest in the world—in spite of its being barely a decade old.

The Smithsonian collection started small

"In 1974 we had five or ten plants," recalls James Buckler, Director of Horticulture. Then Buckler, working closely with orchid-committee members Mary Ripley (wife of Secretary Emeritus S. Dillon Ripley), Paul Desautels and Smithsonian botanists, saw the program quickly expand. A break came in 1979 when Beverly Pabst, widow of the beer magnate and orchid hybridizer Rudolph Pabst, donated their entire 3,000-plant collection. Then in 1982 another bonanza came from Joseph Koss II, a commercial grower who was shutting down his operation in Michigan and wondered if the Institution "could use some cymbidiums." It could. This time the collection consisted of more than 10,000 plants. Several of the Pabst and Koss acquisitions have won Awards of Merit from the American Orchid Society, the 26,000-member group that promotes orchid culture and judges entries in competitions across the United States.

The collections are grown and tended in working

Improvements in breeding have led to hybrids of renanthera and phalaenopsis species, once uncrossable.

Dendrobium anosmum, a wild native of Indonesia and the East Indies, first bloomed in England in 1839.

greenhouses not far from the Mall. Although a steady stream of visitors cannot be accommodated there, the public may see many of the orchids brightening the exhibition spaces in the museums.

While Buckler and his staff maintain plenty of orchids for millions of visitors to enjoy, they are also mindful of the increasingly critical role major collections must play in preserving the gene pool of wild and endangered species that are being lost, particularly to tropical deforestation. To add to their species count they have gone on orchid-collecting expeditions to Panama, Colombia and Mexico, three regions especially threatened by agricultural slash-and-burn.

"These species are not endangered by scientific plant collecting," says Robert Read, a Smithsonian curator of botany, "but they can easily be wiped out by development." His colleague Robert DeFilipps cites the astounding estimate that as many as 200 *billion* orchid plants are being destroyed every year through land-clearing operations around the world. A much smaller number is being removed by commercial orchid collectors, who put the greatest pressure on the showiest species—among them stanhopeas, cattleyas, laelias—which command the highest prices. "Some are so rare they could be rendered extinct in minutes, literally minutes," says Edward Ayensu, a senior adviser to the United Nations University.

An attempt to control the collecting and shipping of orchids falls under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a voluntary agreement signed by 89 nations, including the United States. Established in 1975 primarily to regulate commercial exploitation of rare wild animals, CITES included plants almost as an afterthought. It lists a handful of orchids in its Appendix I, species known to be threatened with extinction; it lists *all* the rest of the Orchidaceae in Appendix II, which is supposed to include species that are not necessarily threatened but that may become so unless trade in them is strictly controlled.

While few disagree with the intent of CITES, many orchid experts point out that such blanket regulations have not held back a few commercial collectors, who have found ways to obtain "legal" permits for illegal plants, and, more important, that the red tape has actually worked to thwart scientists in pursuit of vital research. The problems are now being addressed by an international advisory committee. Among solutions being studied are removing all orchids from Appendix II and naming in Appendix I only those truly endangered by commercial exploitation. Another is to encourage people to buy only orchids known to have been propagated artifically rather than lifted from the wild, although this won't help the scientists. Still another is to establish more orchid-flasking or meristemming labs, particularly in countries of origin.

It has been said that orchids are so fragile and overspecialized as plants that they are doomed to extinction anyway. "For the most part this is nonsense,"

Close-up of pansy orchid lip; it serves as landing strip for insects' approach to pollen column (center).

responds Robert Dressler, a Smithsonian botanist. "Some orchids, to be sure, are strongly dependent on certain insects for pollination and thus for survival. But they have usually 'chosen' insects that are flourishing. It is Man that orchids have most to fear."

"It's population pressure that does it," says Robert Read. "And it is a road that always sounds the death knell. Once a road has been put into a wild area it is easy to cut the trees and haul the logs out. Then the area is used for subsistence farming, exhausting the soil. Within a few years, the forest for ten miles on either side of the road is wiped out, and everything, including the orchids, is gone.

"We know something about perhaps half the orchid species in the world," adds Read. "If we lose the other half before we have had a chance to find out about them, what we haven't learned is lost forever to science. And that could be a tragic loss."

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Circling over Golden Gate Bridge 50 years ago, the *China Clipper* sets out on first flight to Far East.

By Jack Fincher

To be airborne on a not-so-slow boat to China

The golden age of transoceanic flight began in 1935 when a new kind of clipper lumbered awkwardly off to the Orient

Laden with mail, the great amphibian weighed 25 tons, took only 60 flying hours to cover some 8,000 miles.

Dramatic poster links flying boat with old clipper, a name that Pan Am appropriated for its own planes.

As lumpish as a pelican, the plump, snubnosed Pan American Airways *China Clipper* beat foamily down San Francisco Bay. At some critical juncture of hurtling hull and cascading water, all 25 tons tipped forward onto the step behind her nose, then rocked back to lift off in a ribbon of spray, a lumbering giant bound 2,400 miles for Honolulu at an average speed of more than 140 miles an hour.

On board the aptly named flying boat were a crew of seven and almost a ton of mail, including ritual greetings to newly elected Philippine President Manuel Quezon from "that air-minded sailor," Franklin Delano Roosevelt. At the clipper controls sat Capt. Edwin O. Musick, 41, whose quiet, starchy competence belied a turbulent history of barnstorming and aerial rum-running. Musick, in fact, had taught the budding world of aeronautics—by calculated, gut-wrenching example—that the best way to pull out of a tailspin was to go suicidally against your instincts and shove the stick forward.

Now, looming directly ahead of him, Musick saw the unfinished Bay Bridge with its deadly dangling cables. His prototype Martin-130, jammed with extra fuel tanks, labored vainly for altitude. It was no use: they were on a glide path to destruction. In seconds the former stunt flyer made his decision. As a legion of hotshot fighter pilots would later do illegally, Musick eased the yoke forward and flew under the span.

His fellow officers ducked reflexively; on the flag-draped reviewing stand, Pan Am's 36-year-old president, Juan Trippe, flinched. But in the clear, sunlit sky above him, a covey of two dozen escort planes promptly flew beneath the bridge too. It was all part of the drill, wasn't it? Besides—a sentiment that might have been emblazoned on the clipper's nose—where Pan Am led, the nation would follow.

Around the bay, aerial bombs burst, automobile

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Pan Am's Juan Trippe (right) talks over routes with Charles Lindbergh in 1929.

horns hooted, ship whistles, sirens and hoses cut loose in salute. On shore 125,000 spectators waved and cheered in jubilant proxy for the millions more who listened on national networks at home and abroad. Six days before Thanksgiving 1935, the world's first transpacific commercial flight was under way.

In this age of round-the-clock, globe-girdling jets, the astonishing significance of the flight is hard to imagine. But until the *China Clipper* came along, the only way for a passenger to get from the West Coast to the Orient was on an ocean liner—which took almost three weeks and cost up to $1,000. As for packages and produce—these had to go by freighter and might take several weeks longer. Clearly, a bright new epoch in U.S. travel had begun.

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Last month, Jack Fincher wrote about a transatlantic theater feud that led to bloody rioting in 1849.

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tidote to the Depression and the tacit instrument of U.S. Navy strategy against growing Japanese imperialism in the Pacific. The international watchword was no longer geopolitics—the politics of land—but aeropolitics—the politics of air. World powers were beginning to see that where their planes went, so did their flag, and with it, vastly increased opportunities for national influence as well as finance and trade. No target beckoned them more alluringly than the long-distance skyways between continents. And no one was more determined to be first than Juan Trippe, a young American entrepreneur whom the Harvard-educated Roosevelt would later describe as "a man of all-yielding suavity . . . the most fascinating Yale gangster I ever met."

Trippe came equipped with stratospheric ambition and the Old School ties to match. The Army and Navy Departments were stacked with the sons of Eli, and his brother-in-law Edward R. Stettinius jr. was a future Secretary of State. But the engine that drove Juan Trippe—Navy pilot, Yale football player and ex-Wall Street bond salesman—was a passion-

Flying film star Mary Pickford, with husband, was fine publicity in 1937.

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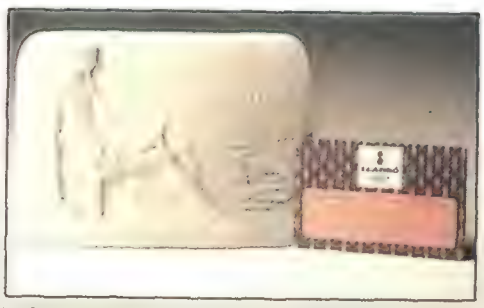

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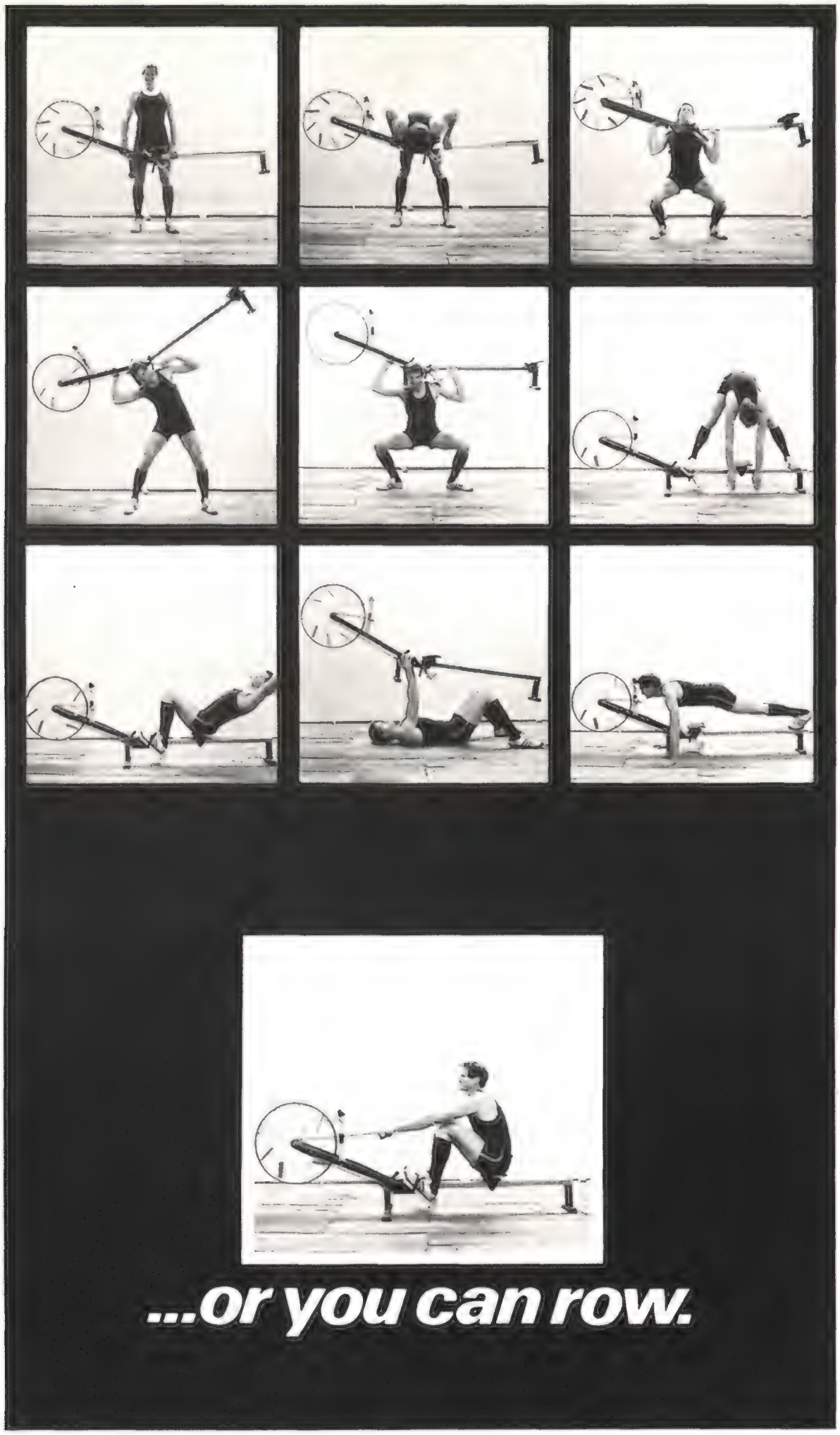

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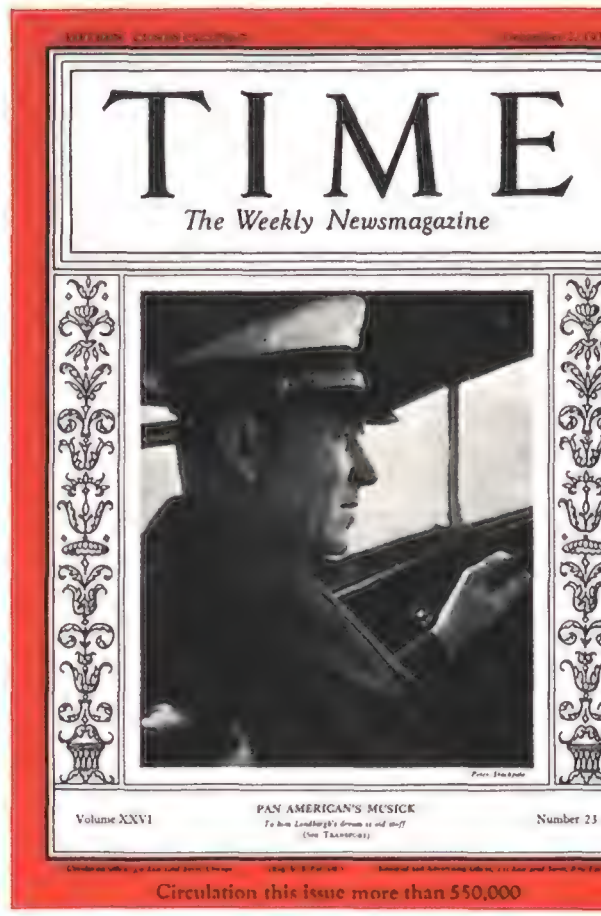

Pilot Ed Musick made cover of *Time* just after the clipper's inaugural flight.

ate vision of American dominance in the air. In 1927, his Pan American Airways had won a beachhead in South America on the strength of a letter granting him exclusive landing rights in Cuba. His attention, however, had soon turned to the rich ocean lanes of North America, and formal talks about joint operations with airlines representing the governments of France and Great Britain had begun without delay.

Only temporarily was he deflected by sudden opportunities in Asia. A possible link was opened to Alaska in 1931 when Charles Lindbergh and his writer-wife, Ann Morrow, were sent north to the Orient, scouting the Great Circle Route through Point Barrow and Siberia to the Far East. Two years later Pan Am established an anchor in Asia by buying an operating interest in China's national airline, the "Middle Kingdom Space Machine Family." But by then negotiations had gone sour because of strained U.S. relations with both a

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Soviet government in turmoil and increasingly suspicious Japan. Trippe was undeterred. "Gentlemen," he told his board, "we are about to fly the Pacific." His directors were stunned to realize that he meant straight across—a distance of more than 8,000 miles.

Pan Am faced two problems. One was equipment. From Igor Sikorsky and Glenn L. Martin, both successful designers of flying giants for the military, Pan Am had ordered $2 million worth of revolutionary new flying boats that could carry 12 passengers, at least 300 pounds of mail and a crew of four more than 2,500 miles against 30-mile-an-hour headwinds. When the new Sikorsky flying boat was launched, however, it lacked sufficient range for the Pacific when fully loaded, while the Martin M-130, which promised to deliver on both crucial counts, was still being developed. The other obstacle was the absence of refueling bases between Hawaii and the Philippines, a daunting 6,000-mile stretch. As Trippe pored over maps in the New York Public Library, the islands of Midway and Guam drew his eye. Both were occupied American possessions, historic stepping stones on the way to China for the swift 19th-century clipper ships that raced to dominate the traffic in perishable tea. Between Midway and Guam, however, appeared to

In 1936 *China Clipper*, Bogart played pilot, Pat O'Brien the airline owner.

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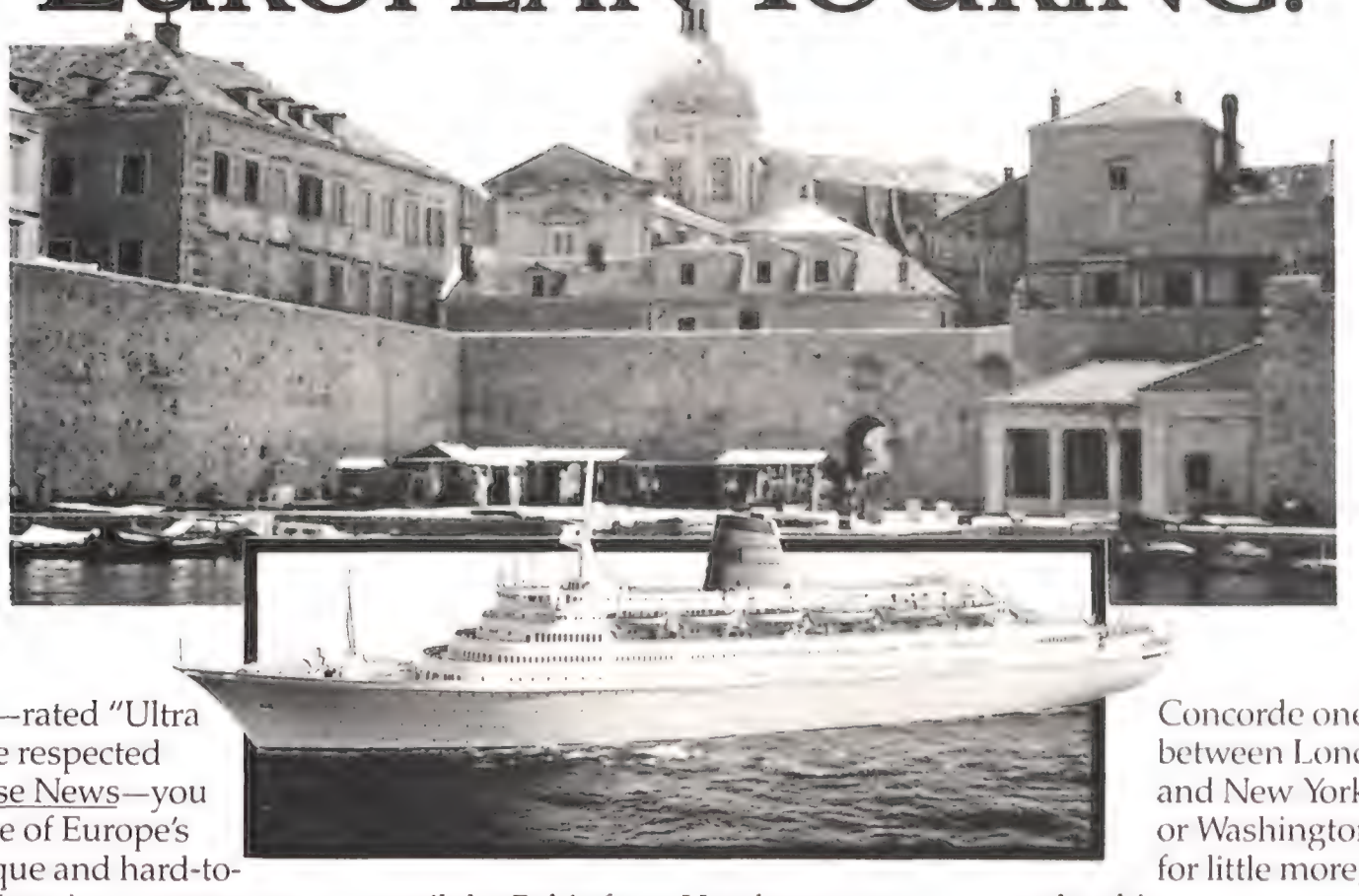

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lie almost 3,000 miles of open ocean. The old clippers had stopped somewhere—but where? Providentially the library had original ships' logs, and there Trippe found the answer: a bleak, barren, uninhabited speck of coral called Wake Island.

From his South American dealings, Trippe had learned something: the success of his applications for exclusive landing rights and federal airmail contracts owed much to government fears of a competing German-operated airline from Colombia overflying the Panama Canal. In aeropolitics, military interests were paramount. Trippe asked Washington for long-term leases in Hawaii, the Philippines and on all three intervening islands. In exchange, he hinted, Pan Am might perform certain politically sensitive strategic services on the government's behalf, such as setting up radio and weather stations or constructing auxiliary landing fields that could be turned over to the War Department in an emergency.

Roosevelt had long felt hindered by treaties that left Navy installations from Honolulu to Manila vulnerable to flank attacks both from the islands of Japan and Japanese bases in the Marianas, Carolines and Marshalls. His administration lost little time in agreeing to a request that—as the Chief of Naval Operations put it in a confidential letter—"would insure the training of necessary personnel, the improvement of materiel and the reliability of these services for wartime use" in the Pacific.

For its part, Pan Am had made an implacable enemy of Japan, whose navy was secretly engaged in the same thing. Bogged down in a conquest of China, the Japanese could hardly be blamed for regarding the company as an interloper. Pan Am pilots bouncing around on survey flights were prickly reminders that the Pacific was not the Emperor's private lake. To make matters worse in Japanese eyes, the steamship *North Haven* would soon leave San Francisco for the leased islands loaded to the gunwales with everything from aviation gasoline, tractors and prefabricated parts for hotels to Ping-Pong balls, pie tins and ice makers. The new China clippers, it appeared, were coming to stay.

No wonder that when the hour at last arrived for Musick's epic flight, strong diplomatic protests were made in Washington. And no surprise either when two Japanese nationals were caught by the FBI tampering with the plane's long-range radio direction finder, an incident that was hushed up for fear of giving the very touchy

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Japanese more diplomatic grievance.

Pan Am was unfazed. The *China Clipper* took off and landed to a tumultuous welcome. Two more Martins, the *Hawaii Clipper* and the *Philippine Clipper*, soon joined in weekly mail and cargo lifts, eventually reaching to Hong Kong and back. By October 1936, when seven seats were advertised for the first passenger flight, more than a thousand people applied. Only a few years before, Lindbergh had thought nothing of having the dockside bars scoured for jittery South American passengers before takeoff from Havana to Miami; now everyone wanted to get into the flying act.

The golden age of the flying boats had arrived. It would last only a decade—until four-engined, land-based planes and then jet engines extended the cruising range of big airliners beyond the mere barriers of water. But in the six years before World War II, the big, radial-engined clippers were glamorous masters of the air. For a people mired in the Depression they epitomized and suggested the exotic romance of the Orient. The original $720 roundtrip passenger fare to Pearl Harbor (real dollars that would more than buy a brand-new Ford sedan) was beyond all but a few. The rest could watch on newsreels the likes of heavyweight champion Jack Dempsey or tobacco heiress Doris Duke in their Palm Beach best being served cocktails or an elegant meal in the clipper lounge, and then . . . the marvelous scudding take-off into the far horizon.

Behind it all, however, was a beguiling blend of image and actuality. The image was a sumptuous pocket ocean liner that flew in smooth and spacious comfort, replete with nautical names, navy blue uniforms, signal bells, life buoys on the walls, and a pilot called Captain. The actuality was a plane often violently tipsy in the water and troubled in the air by a rudder as loose as "a hot knife in butter." The pioneering autopilot

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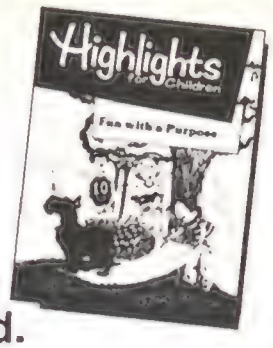

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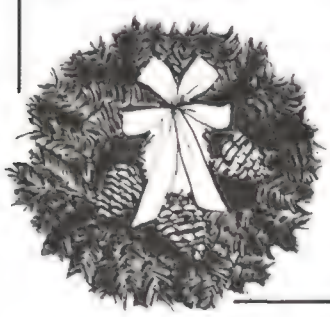

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was so antic in control that it made tail passengers sick. There were the occasional losses of two, three or even four engines from chronic overheating and bad sparkplugs, not to mention a three-bladed propellor that could get so hot that one actually melted off in flight.

The image, further, was an erroneous view of Lindy—actually a meticulous planner—predicting carefree *nonstop* flights everywhere in the world. The actuality was Pan Am Chief Engineer André Priester, an obsessive Dutchman, as meticulous as Lindbergh, who insisted that all captains fly 2,000 hours and make five trips to China before taking command. Priester required crews to be cross-trained as pilots, navigators, flight engineers, radio- and weathermen. He demanded that each clipper be mechanically torn apart and put back together again after every roundtrip flight. He also chided manufacturers incessantly for better fuel consumption, dual electrical and hydraulic systems for safety, extra bulkheads and a compartmented hull that wouldn't sink even if it split open in a stormy sea.

The image was Humphrey Bogart in *China Clipper*; the actuality was Ed Musick, a terse talker of such prosaic sensibilities that when asked to wire something to the breathlessly waiting world about sunset over the Pacific, responded "Sunset, 6:39."

For Pan Am employees on the ground, life at Midway and Wake was a preview of the primitive Pacific war campaigns to come—and the rugged but monotonous rear-echelon existence that would be needed to sustain them. Storms washed away docks and supply drums alike. Underwater coral had to be blasted out of landing lagoons. The workers, most of them Ivy League college boys lured by a thirst for adventure, were homesick, sex-starved, sunburned, constantly sick with fungi and plagued by rats, crabs and swarms of inquisitive tropical birds.

As for flying, it often fit the classic comic definition of commercial aviation: hours of boredom punctuated by moments of stark terror. Cruising the landless 1,200-mile lane between Midway and Wake on a clear day was like being suspended motionless in a vast eerie sphere of two-toned blue. Under the best conditions navigation could be a nightmare. Charts were sometimes as much as 100 miles off, and given unpressurized cabins that robbed the atmosphere of oxygen, celestial calculations became brain-busting puzzles to be solved by navigators who in 18 or more hours never

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dared to take a rest, much less sleep.

Weather included thunderheads that towered to 60,000 feet, headwinds that blew planes backward, typhoons so ferocious that thousand-foot "elevator" drops and uplifts were not uncommon. Once Priester and Boeing's chief engineer Charles Montieth were caught in a big one between Guam and Manila. (Beginning in 1939, Boeing would provide Pan Am a fleet of one dozen B-314 clippers with more power, bigger payloads and greater range than the Martins for its expanding routes to the South Pacific.) Montieth, a witness later swore, literally swallowed his cigar and left his footprints on the ceiling.

Clippers crews, however, were the toast of the Orient. Drinks were on the house, meals in the best restaurants free, impeccable tailoring cut-rate for the asking, as were soft awakenings to the serenading of Hawaiian guitars. The surfboarding and swimming, with presnorkel face masks developed by Japanese pearl divers, were incomparable. Pan Am flying officers were treated to such things as lectures on mahogany as guests of wealthy Philippine planters; given parties cum history lessons by emigré White Russians at Hong Kong; awarded front-row seats at the launching of explorer Richard Halliburton's last ill-fated expedition by Chinese junk; present at the conception of Noel Coward's *Blithe Spirit*—when the playwright and a middle-aged spiritualist were among clipper passengers en route to New Zealand stranded at Canton Island by week-long bad weather.

On one occasion a crew was even joined by Gen. Douglas MacArthur for the late floor show at a Manila hotel. Retired at 50 from the U.S. Army as its youngest chief of staff, the imperious MacArthur, then training the Philippine army, confided his concern about the Japanese. Ah, the Japanese, always the Japanese. In the late 1930s their disturbing phantoms were everywhere. In 1936 Japanese weather signals, long a mainstay for ship traffic in the Southwest Pacific, were suddenly switched to code. A clipper's hull was ripped open at the San Francisco air base by strange concrete pedestals with jutting iron rods discovered just beneath the surface of the water. Sabotage? No one could say.

In 1938, Ed Musick and his crew all died when the *Samoan Clipper*

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blew up in flames while surveying a new route through Pago Pago. This was clearly an accident. But six months later a planeload of passengers was mysteriously lost when the *Hawaii Clipper* vanished without a trace between Guam and Manila—the world's first suspected skyjacking. A Chinese-American was believed to be aboard with millions of dollars for China's Nationalist government. What's more, the Japanese, denied American designs, were known to be devising their own flying boats which turned out to be remarkable copies.

Late in 1940 Adm. James O. Richardson, Commander in Chief of the U.S. Fleet, expressed to FDR's face his lack of confidence in the government's ability to carry out a war in the Pacific successfully—and was soon replaced for having "hurt the President's feelings." The smell of war was in the air. Sealed orders were soon issued—not from the War Department but from Pan Am to its clipper commanders—for *when* the Japanese attacked, not *if*. In New York, Juan Trippe casually told a company lawyer, "We're expecting the Pacific route to be cut."

On the day of infamy, December 7, 1941, junior station manager Joe Pease was one of two Pan Am employees on duty at Pearl Harbor when a loud explosion sent them running up the steps to their rooftop observation platform. A Japanese fighter plane zoomed by. Pease looked at his watch; it was 7:55 A.M. About 500 yards away, on three destroyers snubbed up to the dock, men were clambering on the deck in their skivvies. Pease still gets tears in his eyes when he remembers what happened next: "I was shouting 'Shoot, goddammit, shoot! Somebody shoot!' The first shot went up and I looked at my watch again. Only four minutes had elapsed. From peace to war seemed an eternity."

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fornia. At Hong Kong the Japanese bombed and strafed the *Hong Kong Clipper,* destroying it on the ground. In the air between Wake and Guam, the *Philippine Clipper* was told of the sneak attack and ordered back to Wake, where it was refueling when waves of incoming Japanese fighters attacked. Despite 60 bullet holes, the big Martin miraculously survived to fly. Its captain left his cargo of mail to be burned by beleaguered marines, loaded up civilian passengers and Pan Am personnel, and took off for Midway. He arrived to find the harbor aflame from the shells of Japanese warships. Refueling in darkness at the far edge of the island, he flew on to the devastation of Pearl Harbor and from there, two days later, back to San Francisco and safety.

At the controls of the *Pacific Clipper,* a new Boeing-314, 35-year-old skipper Robert Ford landed in Auckland, New Zealand, and waited a week for orders. His clipper was one of less than a dozen long-range, heavy-cargo aircraft left in the world. It could not be allowed to fall into enemy hands. Ford was to proceed west to New York—more than half the world away. With no lights, little navigation aid except for a few geography books, and for the most part unable to break radio silence or warn friendly harbors en route that they were com-

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Advance Commissioning Deadline: November 30, 1985

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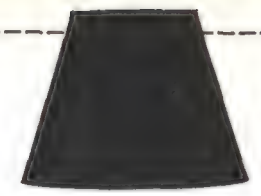

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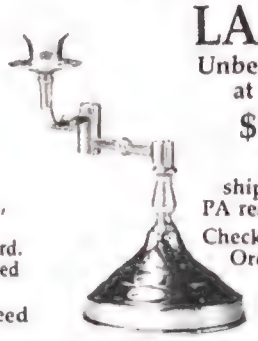

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ing, Ford and his crew took on a hasty coat of camouflage paint, a load of airline employees, as much fuel as they could carry—and ten days before Christmas started for home.

From Auckland they hopped across Australia (dropping off employees en route) to Surabaya in what is now Indonesia, where swarming Dutch fighter planes threatened to blow them out of the sky unless they landed, absolutely without deviation, in the mined harbor. There the clipper topped off on 80-octane automobile gas in the absence of 100-octane aviation fuel and flew almost 21 hours across the Indian Ocean to Ceylon (Sri Lanka) passing right over the crew of a surfaced Japanese submarine on deck getting fresh air.

From Trincomalee, their engines knocking with auto gas, they were no sooner in the air bound for India, when one of the abused engines blew, forcing them back. Borrowing cold-rolled steel and the use of a lathe from a British warship, the flight engineer fashioned a special tool and on Christmas Day repaired the broken studs that held the cylinder. After nights in Karachi . . . Bahrain . . . Khartoum . . . the clipper flew on to land in Leopoldville, Belgian Congo (Zaire). Caught in a six-knot current on the Congo River with a heavy load of fresh fuel, Bob Ford labored with all his skill and knowledge to get the big ship aloft as he steered a fishtailing course between the high gorges, dodging boulders, hurtling downstream toward cataracts he dared not think of.

According to Boeing's engineering specs, one minute was the maximum allowable for full throttle without risking a burnout. Ford held her open for more than three minutes before he lifted the clipper off the water, cleared the narrow, looming gorges and started to climb. Then it was west to Brazil, north to Trinidad and, with repaired engines hammering erratically in protest, ship and crew started on the last leg home.

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After Pearl Harbor, Robert Ford evaded Japanese, brought his clipper home.

a frigid January 6, the loudspeaker in the control tower at New York's La Guardia field crackled to life. Though few knew it yet, in minutes the *Pacific Clipper* would cast up in the freezing black waters of Bowery Bay. After flying more than 31,500 miles —from San Francisco to New York— in 207 air hours on one change of sparkplugs, virtually without mechanical incident, Ford ran temporarily aground on a sandbar. The back of his neck flushing with embarrassment, he gunned all four engines, skidded off and bumped up to a landing buoy.

Flat broke, the 11-man crew straggled off the plane, dirty, unshaven, wrapped in blankets and shivering in their tropical khaki shirtsleeves and shorts. Not your Pan Am crew of image, to be sure. But behind them lay a record-shattering voyage of 18 stops, three oceans, five continents and six equator crossings. The *Pacific Clipper*'s journey marked the first round-the-world voyage by a commercial airplane and the longest continuous flight ever for such a craft—a feat made even more astounding because the flying boat traveled over thousands of miles of land but could touch down only on water.

During their six years of service, the clippers had carried thousands of passengers and thousands of tons of mail and cargo over millions of miles. Shortly after the war began the ten remaining Martin and Boeing clippers were turned over to the military but run by Pan Am crews. The B-314s alone flew 7.5 million wartime miles, mainly in the Atlantic, carrying a million tons of high-priority cargo to far-flung war theaters, as well as 61,000 military passengers. Veterans of the Pan Am operation went on to build bases in Africa and train military and naval crews in long-distance navigation and weather prediction.

Many of the Boeings made it through the war only to be scrapped shortly thereafter. The *Philippine Clipper* crashed in California in 1943, and the *China Clipper*—first and last of the magnificent Martin flying boats —met her end while landing at Port of Spain, Trinidad, on January 8, 1945, signaling the close of an era.

But in early 1942, for a moment after the tower speaker came on, there was only the silence of a New York winter morning to commemorate the *Pacific Clipper*'s historic passing. Surely someone would rise to the occasion with suitably ringing remarks?

A voice, flat and slightly bored, finally filtered through: "*Pacific Clipper*, inbound from Auckland, New Zealand, Captain Ford reporting. Due arrive Pan American Marine Terminal La Guardia seven minutes."

Ed Musick would have been proud.

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By Edwin Kiester jr.

A deathly spell is hovering above the Black Forest

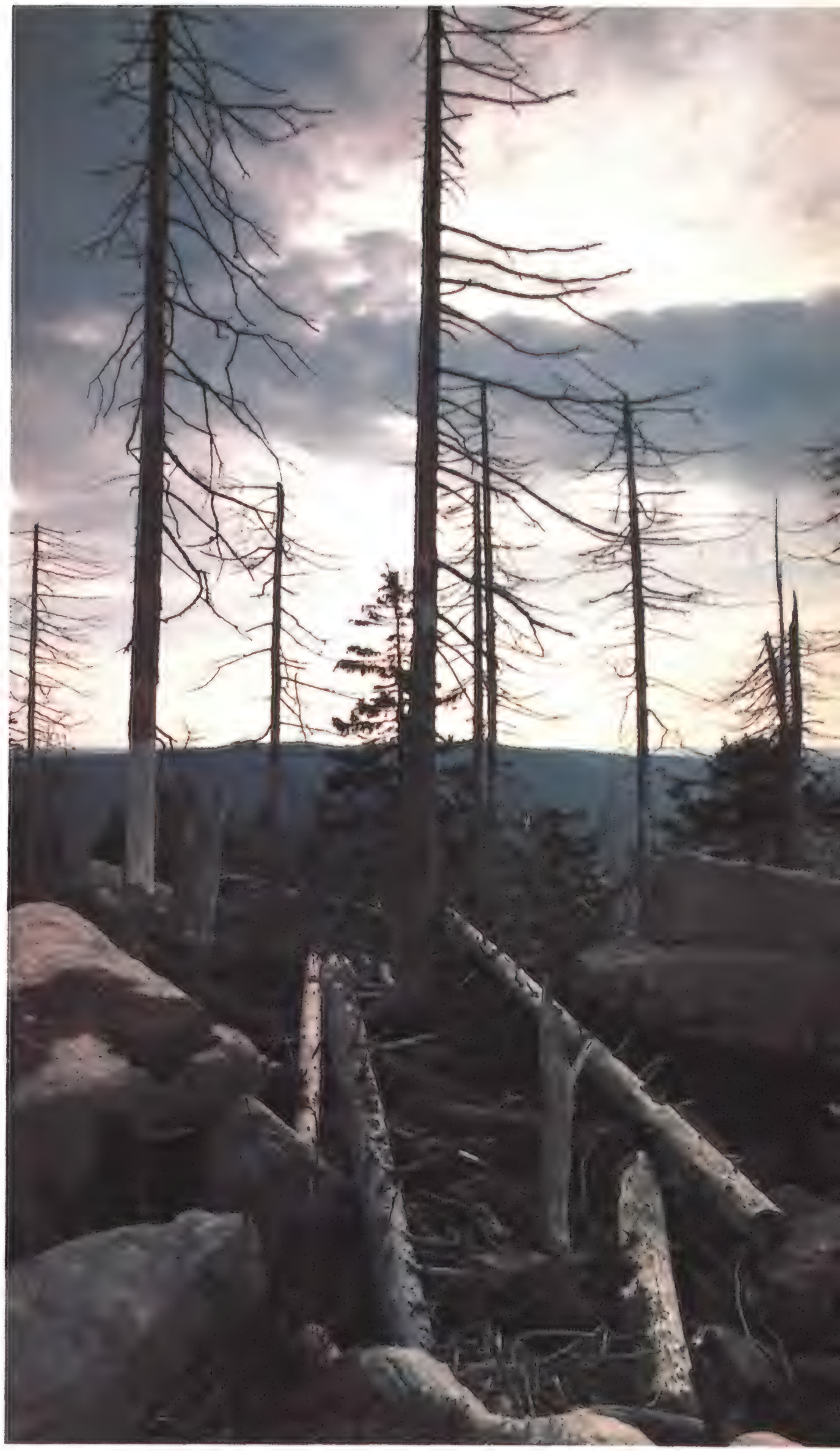
In Hansel and Gretel's magical land, scientists are trying every trick in the book to keep trees from disappearing

In the valleys on the edge of Germany's Black Forest, the cherry blossoms had burst into bloom, but near the summit of the 3,600-foot Blauen mountain, an unseasonal May snowfall draped the trees. The light mantle of white gave a peaceful, Christmas-card quality to the quiet landscape. But it could not conceal the anguished expressions of the foresters and scientists who had brought an American journalist to take a look at ailing and dying trees.

Reinhard Huettl, a forest nutritionist from the University of Freiburg, scrambled up a hillside through the snow. Tearing a branch from a house-high Norway spruce, he shook off the wet flakes and slid back to the trail where the rest of us were. He held the lemon-tinged bough aloft.

"The older needles are already yellow," he said, his finger tracing the central stalk. "Here at each tip you can see the needles are green, but when the buds burst they will turn yellow, too."

Hans Happle, the district forester, brushed snow off his black beard and gazed up at a towering silver fir. The



Dead spruce and fir trees line ridge of Forest's Katzenkopf Mountain.

Photographs by Wilfried Bauer

The newlyweds were off to live in America. She had put off saying good-bye until the very last moment.

As always, he had something for her: an antique cameo brooch. "It was your mother's," he said. "I know she'd want you to have it." Then she tried to put her feelings into words.

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The last time she saw England.

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upper portion of the 200-foot trunk was nearly bare of branches, but at the very crest a fan-shaped shock of foliage crowned the stem. It looked like a giant feather duster.

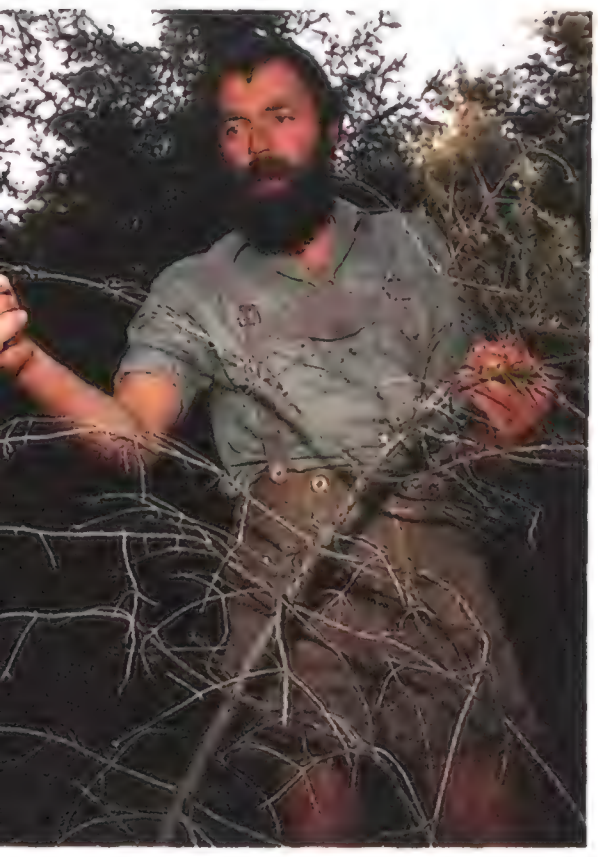
"We call that the stork's nest," Happle explained. "It is the silver fir's last effort to save itself. See the branches of the Norway spruce nearby, with the twigs hanging slack? That is another symptom. We call it the 'silver tinsel effect' because the dangling twigs make it look like a tree decorated for Christmas.

"That fellow will have to come down," he continued sadly. "Last autumn I took 400 firs out of this area of the forest district and now we must cut more."

He pointed to logs from the earlier harvest lying along the road. "Those trees were more than 150 years old. This used to be the most productive part of the forest, fairly good soil, about 70 inches of precipitation a year. The trees lived to be 200 years old. Now we have suddenly this heavy decline. Every year it becomes worse.

"We will soon have no forest left," he said to Huettl desperately. "Something must be done soon. Three or four years from now will be too late. The trees cannot wait."

The Black Forest is sick, and some people fear the illness is terminal. On the mystical slopes that the Roman legions christened Silva Nigra for their endless dark stretches of brooding evergreens, two out of three trees are diseased—one out of five moderately damaged, and one out of 50 beyond hope or dead—which does not count trees already dead and removed. According to a ground and aerial survey conducted in July 1984, the illness has struck 89 percent of the silver firs, 65 percent of the Norway spruces, 64 percent of Germany's beloved beeches, and 66 percent of the oaks. And the disease is worsening. The 1984 figures showed that sick trees cover two-thirds of the forest area, up from one-half the year before.



Forester Hans Happle examines one of many ailing silver firs in Black Forest.

And yet—despite identification of a prime suspect, plus a scientific offensive that has made saving the forest a national priority—no one is sure how the deadly disease develops, whether it can be treated, or whether the forest can be preserved. There is only one point of agreement: the outlook is bleak.

"It is frightening," declared Gerrit Mueller, a forester from the service headquarters in Freiburg. "Some people think that in five years there will be no forest left. To think that an entire forest might die is incredible. Yet when you see pictures of what has happened in Czechoslovakia, whole forests utterly dead, you know it can happen. It is a horror vision. When old trees die, like old people who die, well, that is sad. But when young people or young trees die in great numbers, that is catastrophic."

The mysterious *Waldsterben*, which roughly translates to "forest death," is by no means confined to the 7,200 square miles of the Black Forest. More than 50 percent of German for-

The author, who lives in Palo Alto, wrote The Better Homes and Gardens New Family Medical Guide.

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ests are showing the telltale signs of yellow needles, drooping boughs, undersized trunks and, among the hardwoods, premature loss of leaves in August and early death of new saplings. Two-thirds of the most productive forests in Bavaria are afflicted, along with alpine woodlands in Switzerland and Austria. Many forests in East Germany, Czechoslovakia and Poland have also suffered severe damage. Symptoms have been detected in the Vosges Mountains of France and in Scandinavia.

In the United States, forest scientists have been worriedly watching conditions in the Adirondacks, Green Mountains of Vermont and North Carolina Appalachians. Trees in those areas have shown diminished growth since 1960. Tree-ring measurements on thousands of trees from Maine to Alabama have shown growth rates ten to 40 percent lower than expected over the last decades. Symptoms are not identical with those in Europe, however.

The Black Forest has an almost mystical hold on Germans. Continued damage could be a devastating blow to Germany's lumber industry, not to mention the consequences for flood control, agriculture, wildlife and recreation. Perhaps more important would be the spiritual loss. "Losing the Black Forest," says Frank Horsch, whose agency coordinates research in the forest's home state, "would be

Norway spruce's loss and yellowing of needles indicates magnesium deficiency.

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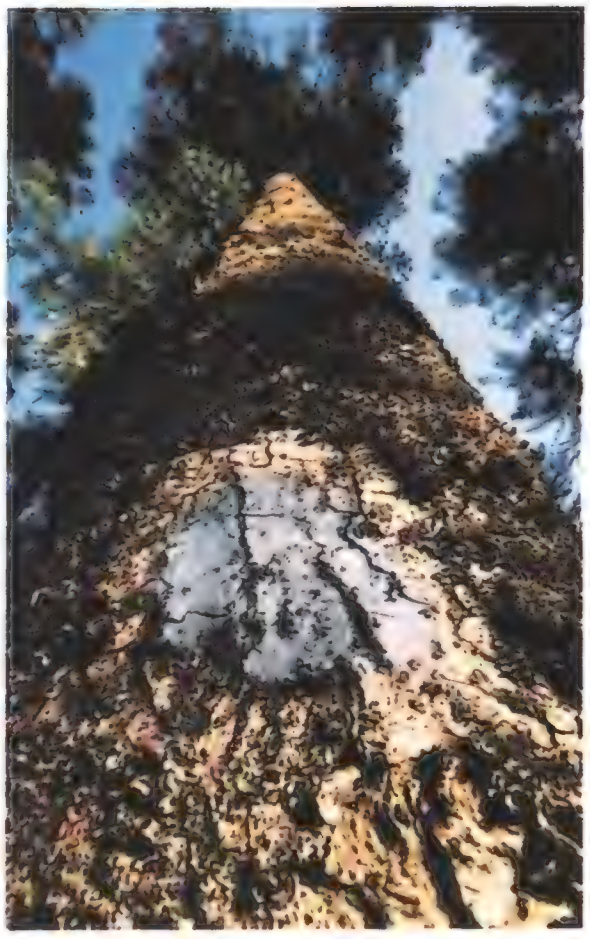

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just like having the Rhine dry up."

When the forest began to look sick in 1976, no one was terribly concerned. It had been a hot, dry summer with lots of sunshine, and the first victims were silver firs, notoriously drought-susceptible. But in 1979, indifference changed to alarm. The normally hardy Norway spruce, which makes up half the Black Forest and is nicknamed the "bread tree" because of its great economic value, began to lose needles, too.

By 1982, *Waldsterben* had swept through the evergreens and begun to appear in the beeches and oaks. More ominously the disease, which at first seemed confined to older trees at higher elevations, crept farther down the slopes and attacked younger and healthier stands.

On the official government map of forest damage, a deep red color marks the areas in which up to 70 percent of needle loss has occurred and the Black Forest appears as a blood-red blob. A casual visitor to the land of Hansel and Gretel would hardly

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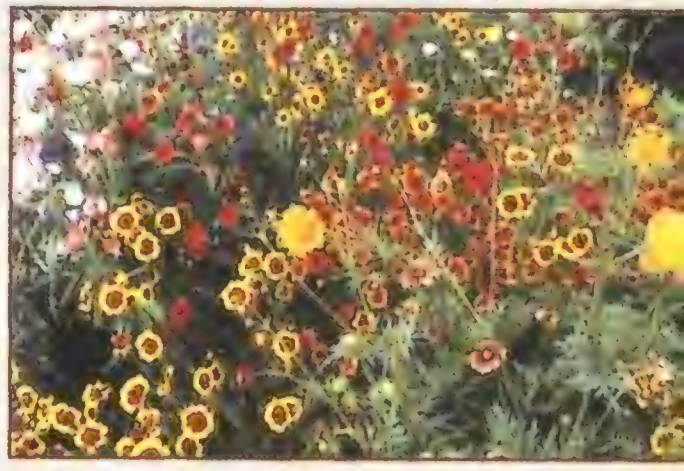

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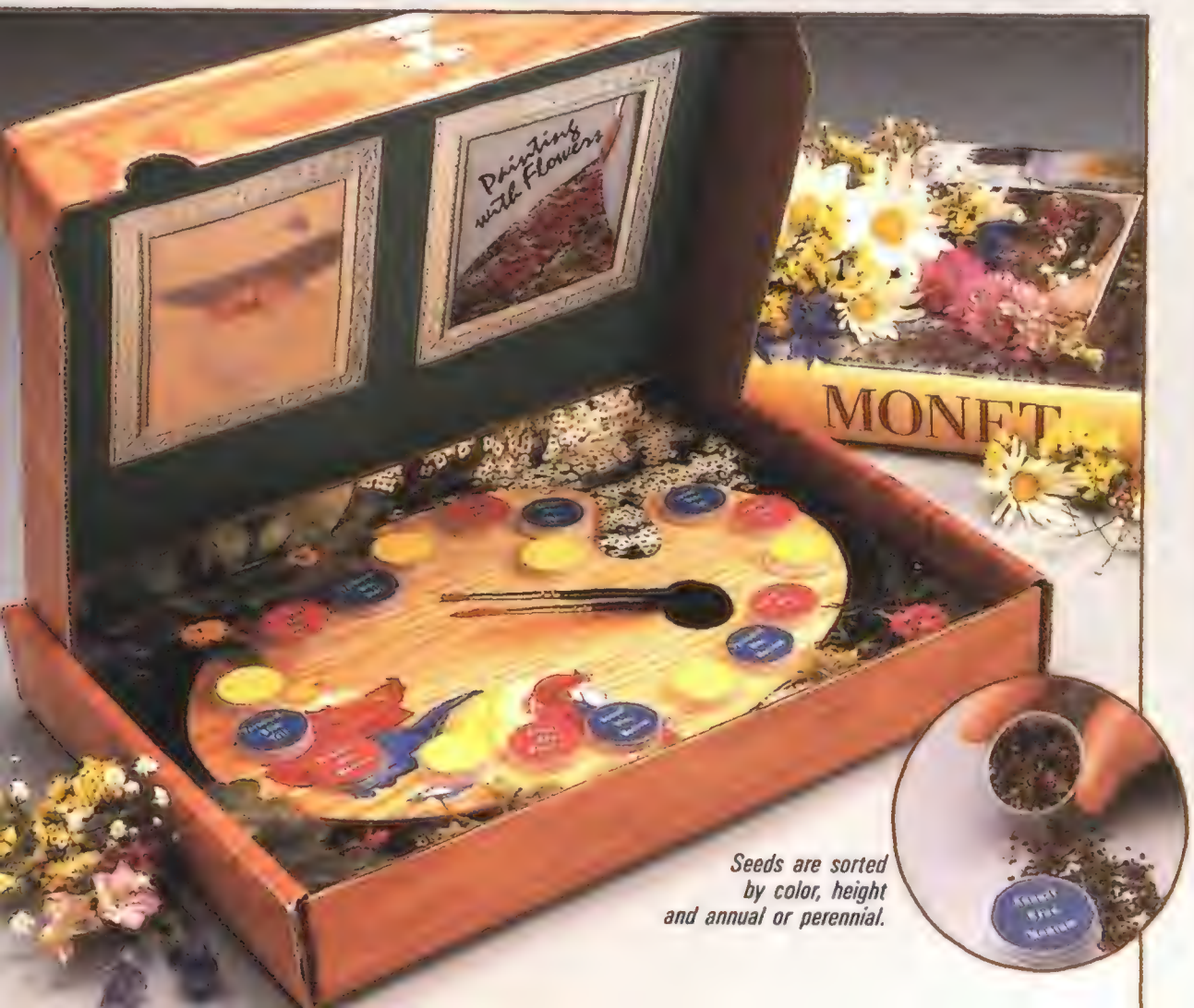

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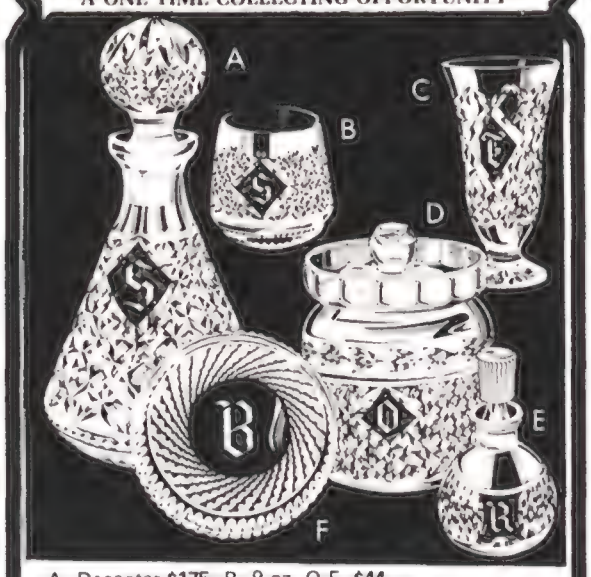

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know it. When I hiked the cool, canopied trails the autumn before, the glades were as lush and charming as when Mark Twain described the forest's "rich cathedral gloom" in 1878. That postcard perfection is a result of Germany's forest management: when a stricken tree is in its death throes, it is cut down while its lumber is still useful.

But in one area you can get a sickening closeup of the forest's threatened future. During my autumn visit, Gerrit Mueller took me to the Kälbelescheuer, a ridge of the Black Forest's reputedly most beautiful mountain, the Belchen. There the foresters had left damaged trees standing to demonstrate to Germans the ravages of the disease. The trunks of the trees had been carefully painted with circles designating their degree of damage. A white circle denoted ten to 25 percent damage; a blue circle 25 to 50 percent; a red circle 60 percent or greater. Virtually every trunk had been painted.

Overhead, bare branches were stitched against the sky. Yellowed needles contrasted against the green. The trail wound along the ridge until it reached a scenic outlook. There in the distance spread the familiar Black Forest panorama—fertile pastures, polka-dot cows, half-timbered farmhouses. But on the opposite ridge lay a ghastly sweep of gray, a

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Georg Krause tests how acid fog affects nutrient leaching of a Norway spruce.

horrifying tangle of dead trunks, fallen branches, ghostly trees without needles or leaves. It was like a scene from a doomsday movie.

When Germany first began to take the forest disease seriously, everyone thought they knew the cause: acid rain. That catchy term, a headline word all over the world, refers to sulfur dioxide and nitrogen oxides—which are by-products of fossil-fuel combustion in power plants, industrial boilers and motor vehicles. Emissions from power plants are often swept across international boundaries and dropped on the forests by rain filtering through acid-laden clouds.

In Germany's case, 50 percent of sulfur-dioxide deposition was said to originate in other countries. The idea that foreigners were killing German trees caused a great stir and, in the words of Georg H. M. Krause of the North Rhine-Westphalia Emissions Research Institute, "made an instant expert of anyone who could say 'acid rain' ten times in a one-minute television interview." But in the past two years, imported sulfur dioxide has partially been exonerated, at least in the Black Forest, where its amount in the atmosphere measures less than it did 15 years ago, and is lowest of all where trees are sickest. In fact, lichens known to be killed by sulfur dioxide are thriving on the very trees dying of *Waldsterben*.

Today, polluted air is still considered the chief cause of forest decline, but in another form that is decidedly homegrown. The message is delivered emphatically as you drive down the serpentine Hell Valley from the Black Forest to Freiburg. "*Autos Töten Wälder*," an accusing, six-foot graffito shrieks from a railroad trestle—"Cars Are Killing Forests." The Germans have had to confront the possibility that their love affair with the automobile is doing in their trees.

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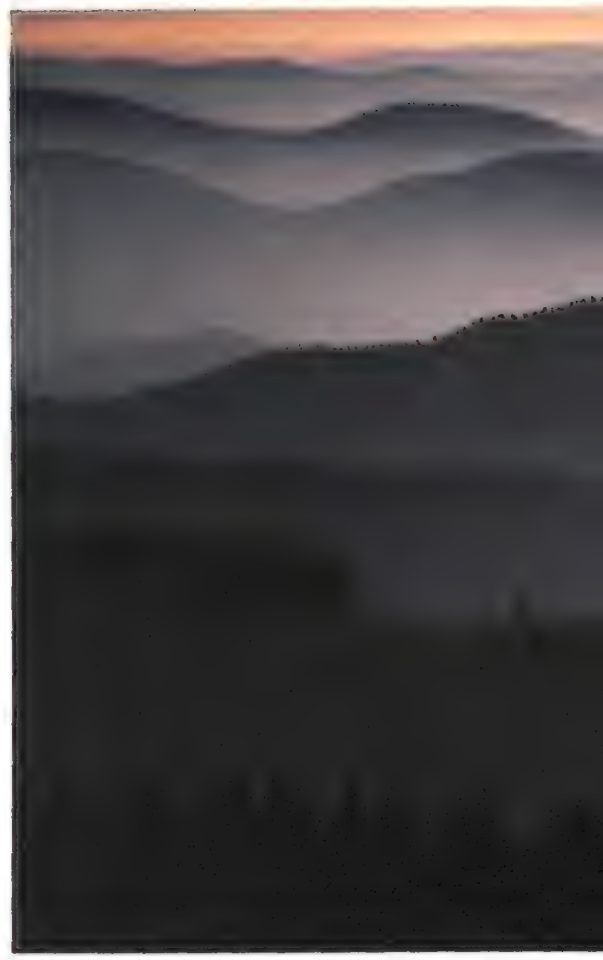

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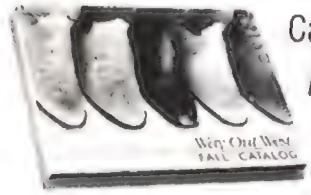

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and its auto and truck traffic is the densest in Europe. In fact, it has more cars per square mile than any other nation in the world.

Huettl took me to the top of the Kälbelescheuer and explained what was happening: "The forest decline is occurring in many terrains, in many climates, among many species. Only a few factors could have such a widespread impact. Weather is one, and air is another.

"There is no doubt in our minds that air pollution must be the major factor," he said, especially nitrogen oxides from auto emissions. It used to be believed that automobiles could not be responsible, for there is so little traffic in the forest. But nitrogen oxides from auto emissions in the cities and on the autobahns are carried up into the atmosphere. The nitrogen oxides lead to the formation of ozone, which in high concentrations can be fatal to trees.

"There is an old saying in forestry: ask the trees and they will tell you the problem. You don't need fancy

But in fact, two out of three trees are ailing, with one in 50 beyond hope.

equipment or computers, you just go into the forest and ask the trees," Huettl said. These trees are starving for magnesium, the vital element in photosynthesis. Ozone breaks down the protective membranes of the needles, and rain and fog wash out the nutrients, including magnesium. In some soils trees can simply take up a new supply but here the soil is granite-based and thus magnesium-deficient, Huettl explained.

The prevailing weather pattern in the Black Forest seems to support this hypothesis. According to Horsch, temperature inversions that trap the polluted air are common between 2,600 and 3,300 feet—the precise altitudes at which damage is most evident. These altitudes are also shrouded in fog up to 200 days a year, so that pollutant-laden moisture can remain in contact with the fragile needles for days at a time. In fact, Horsch says, the Black Forest climate is almost made to order for forest destruction. Long stretches of sunshiny days that produce high levels of ozone are fol-

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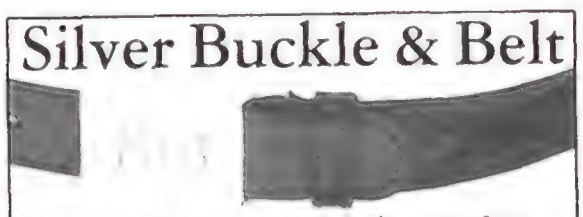

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lowed by equally long stretches of fog with high needle washout.

Other scientists say that air pollution may be responsible for killing the trees, but that ozone may not be the only or even the principal culprit. A new avenue of research contends that the guilt falls on no single air pollutant, but rather on an as-yet unknown interaction among them, so that the whole impact is greater than the parts. Another faction points out that nitrogen oxides precipitate as nitrates, a form of fertilizer. The nitrates stimulate the tree growth to such an extent that it does not "harden off" in winter, and then is devastated by the cold.

The case against the air is all circumstantial. No one yet, in Georg Krause's words, has found "a smoking gun"—proved beyond doubt the cause and effect. Consequently, a number of other hypothetical explanations are being trotted forth. In fact, there are so many that when I told Huettl I hoped to interview all the leading researchers on forest disease, he whistled and said, "In the end, you will either be totally confused or have your own hypothesis." His superior, Heinz Zoettl, smiled. "That will be Hypothesis No. 89," he said.

At the University of Göttingen, Bernhard Ulrich argues that the trees are not being strangled by the air, but rather they are being poisoned through the soil. Ulrich, a wiry, energetic man who describes himself as an

Tobacco, bean and other sensitive species are exposed to air to study symptoms.

Forest nutritionist Reinhard Huettl notes the effect of fertilizer on trial plots.

ecologist rather than a forest scientist, actually predicted the forest decline and then had the grim satisfaction of seeing his forecast come true.

"If you measure what goes in and what goes out, and you have the balance data, it was easy to conclude that the situation couldn't continue," Ulrich says. "There was a constant loading of sulfates which increased the acidity of the soil. In our hypothesis, the acid released the aluminum ions which are normally tightly bound at the soil surface. Aluminum is very toxic, especially to the fine roots of the trees."

On the outskirts of Munich, in a former nuclear-research laboratory, an effort has begun that will eventually answer important questions about the causes of *Waldsterben*. For the first time, air pollution's effect on trees will be measured under completely controlled laboratory conditions. The new facility consists of three closed chambers where temperature, atmospheric composition, precipitation, humidity, artificial sunlight, and even dew and snowfall can be rigorously simulated and regulated. Each chamber will hold six plots of six 12-foot trees and a planned addition will accommodate even larger ones.

But despite the effort and expense, the scientists agree that the exact details of the forest decline may not be

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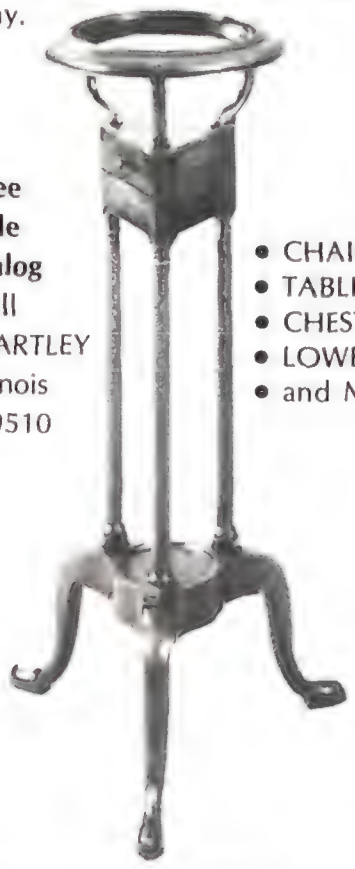

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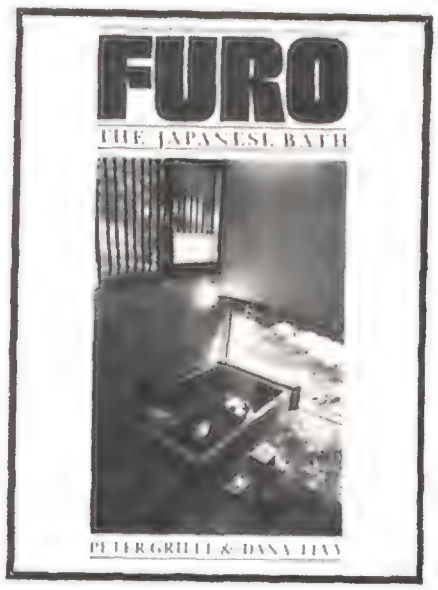

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known for many years, while the damage keeps escalating. (Indeed, a Freiburg economist, testifying in a court case, estimated that if the damage continued, the average woodlot owner would sustain a loss of more than one million Deutschmarks by the year 2015, while another said the dieback could produce unprecedented disaster on the lumber markets of the world.) And an explanation tomorrow would be small consolation to a man like Hans Happle, watching the most beautiful part of the forest suffer before his eyes today. Thus a crash program is on to find short-term solutions to maintain the trees until a longtime answer can be found.

On that snowy morning in the Black Forest, Huettl took his companions to see the results of one small interim project. In a heavily damaged area near Freiburg, he had fed yellowing, magnesium-starved trees heavy doses of magnesium sulfate, followed by lime, to stabilize the acidity of the soil. Standing in the snow before one of the trees, he proudly showed photos of the tree as it had looked the year before.

"Within five months, we were able to revitalize the trees," Huettl said. "You can see that the symptoms have vanished and the needles are all green, although in the photograph they are yellow. We were not able to help all the trees: some were too greatly diseased for the condition to be reversed. But we believe that fertilizing trees in the moderately diseased category could stop the progress of the disease and reverse it."

Another quick fix strikes close to another cherished part of German life: fast driving. According to Swiss experiments, internal-combustion engines operated above their most efficient speed produce ten to 15 percent more pollutants. Yet German autobahns have no official speed limits, as many a terrified visitor has discovered when a Mercedes bears down on him at 100 mph. Environmentalists say that a speed limit of 74 mph on the autobahn and 50 mph on other highways would cut emissions and reduce tree damage dramatically. "And the government could do it from one day to the next," says Renata Mohr of the Green Party, noting that Austria and Switzerland have already adopted the 74/50 mph limits.

Traffic emissions from Germany's autobahns, which are among the most heavily used highways in the world, may be the prime cause of forest decline.

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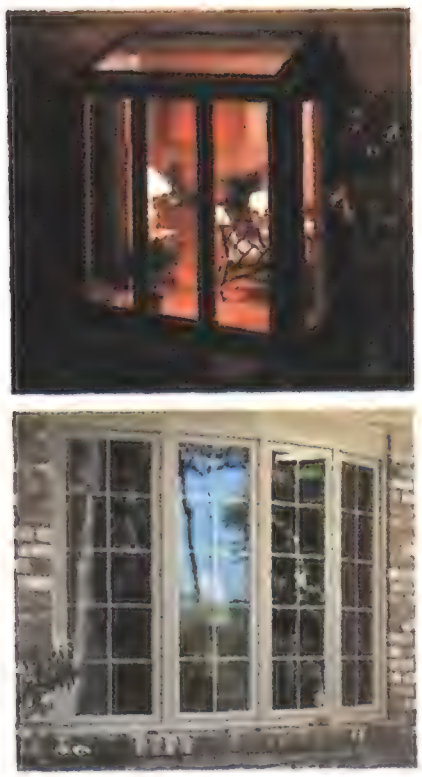

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In a nation where auto manufacturing is the No. 1 industry, reactions on both sides have been strong as the government has pushed for restrictions within the forum of the European Economic Community (EEC). Last fall, 25,000 persons thronged the main square in Freiburg to demand "tempolimits," but the rally was dwarfed by a 100,000 turnout in Stuttgart. A public-opinion poll by the newspaper *Bild Zeitung* showed that 71 percent of its readers favored limits, and Germany's largest automobile association endorsed the proposal on behalf of its 7.5 million members.

Last fall, the German Bundestag, the equivalent of Congress, decided that new autos sold in Germany must meet the same exhaust-emission standards as in the United States. The exact method was not prescribed, but the only available system was a three-way catalytic converter, similar to that used in America, which would add $500 to the cost of a car. To soften

The trees are fumigated with ozone, and the soils are investigated as well.

the impact, the legislation established tax subsidies based on engine size.

Although the new proposal was seen as exceedingly cautious—because old cars could be driven until they wore out, some estimated that ten years would pass before the effect would even be noticed—it created an uproar both in and out of Germany. Some Germans saw the law as an attack on their cherished love of travel. Also, much traffic in Germany originates elsewhere—Dutch and Belgians heading for the Mediterranean, Italians and French going north.

The greatest opposition came from other nations in the EEC—Britain, France and Italy. Germany's trading partners protested that the proposed regulations violated the EEC charter allowing all nations equal footing in others' markets. The standards and tax subsidies were said to discriminate against French and Italian manufacturers. The effective date of the large-car requirement was put off until 1988, of the smaller ones until 1992.

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The other countries also balked at German proposals for Europe-wide air-pollution standards, because the problem was primarily German. If the Germans really wanted to save their forests, the other nations suggested, they could begin by imposing autobahn speed limits.

Motor vehicles also may contribute to U.S. forest declines, even though vehicle exhaust is more strictly controlled here than in Europe. U.S. sulfur-dioxide emissions have stabilized or declined since 1976, but nitrogen oxides, half of which come from cars and trucks, are rising—and the vehicular proportion is rising fastest.

Forest declines in the United States are by no means so widespread nor so ferocious as the German *Waldsterben*, according to Ellis Cowling of North Carolina State University, who prepared a comparison of conditions in the two countries for U.S. and German researchers. Only two species in this country, the red spruce and Fraser fir at high elevations in the southern Appalachians, show the distinctive inside-out yellowing and thin crowns of the Black Forest trees. Each of the other affected species, which include various types of pine, oak, ash and the vaunted Vermont sugar maple, seems to have its own pattern of symptoms. "The truly distinctive feature of the forest decline in Central Europe is the number of species involved," Cowling says. "Characteristically, forest diseases are specific to one host. Never before have we seen a disease that attacks multiple species under all sorts of conditions, as is happening in the Black Forest."

International problems were of little concern to the small group on the Blauen trying to devise a solution that would keep the Black Forest alive. In Bonn, one official at the agricultural office has suggested that the only possibility lay in the supernatural; one simply had to "hope" that eventually air pollution and the forest decline would be reversed. "It's a matter of faith, like believing in God

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or not," he said. The Black Forest task force concluded that faith was not enough. But it was a decidedly gloomy group that descended from the mountains, reassembled in a tiny café in the hamlet of Marzell, spread their topographic maps and tried to decide what to do.

Over schnitzel and beer, they outlined the situation. The greatest damage was on the peaks of the Blauen and Stockberg mountains and encompassed the Kandern Valley and the hillsides surrounding it. Virtually every tree in this area was diseased, Happle said, some of them desperately so. And if the research was correct, the situation could only grow worse. The vulnerable slopes faced directly into the prevailing air currents from the Rhine, and the Kandern Valley's steep-sided blind-canyon topography trapped winds and captured fogs and maintained damaging elements in contact with the trees for long periods.

One of the foresters said he couldn't estimate how long the trees might survive, but it seemed unlikely they would wait until people in Bonn and Brussels decided what to do about air pollution. All eyes turned toward Huettl. Could fertilization help?

The forest nutritionist began by saying that fertilization was not a cure-all. Many trees could not be saved. "There seems to be a critical point, beyond which fertilization is too late," he said. The rest might benefit from a two-stage fertilization project. Water-soluble pellets of magnesium sulfate could be administered at a rate of 700 pounds per acre. Later, dolomite lime would be added, one ton an acre, to offset the acidic fertilizer. Because of the steep and rough terrain, the fertilization would have to be done by helicopter and fixed-wing aircraft. Huettl estimated the cost at $60 to $120 an acre. The effort might buy the trees another five to ten years.

Huettl warned the others not to hold false hopes. It would be next spring, he said, before the results would be known. It would be even longer before the already devastated sections would begin to regenerate. In the long run, the forest needed a cure, not a Band-Aid.

"We are only treating the symptoms," the young man said with fervor. "Fertilization is only a tool to revitalize the forests until there is cleaner air. It is like giving insulin to diabetics. It keeps them going but it doesn't cure the disease. Fertilization is fine, but the only real hope is to clean up the air."

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Book reviews

Table of Contents
John McPhee
Farrar, Straus & Giroux, $15.95

I'd call John McPhee an exploratory rather than an investigative journalist. He calls himself "a reporter, a writer, repeatedly trying to sense another existence, and in some ways to share it." In this latest assemblage of his looks at energetic people and the careers or avocations they pursue, McPhee is sometimes at his eagle-eyed best, sometimes only perfunctorily skillful at elucidating odd subjects or revisiting old territories.

In northern Maine, McPhee joins forces with his namesake, a fish-and-game warden and bush pilot, and also sometime magazine writer. The account of their several flights together through Maine's spectacular Allagash region is a loose, rambling talk about moose hunting, skiing, getting lost in the woods and, more generally, "the other" John McPhee's "compatibility with the backcountry and everything that lives there."

Our writer meets with wildlife biologists making better lives for black bears in Pennsylvania and New Jersey. He gets the lowdown on the history and ecology of the beasts, snoops inside dens and becomes acquainted with some cuddly newborns, and learns how modern radio communication makes feasible a "foster-mother program" for abandoned cubs. He goes to see what nuclear physicist Theodore Taylor (once affiliated with the Los Alamos Project) is doing these days: he's involved in a plan to store huge amounts of ice and recycle ice water to produce air conditioning without "the use of fission and fossil fuel" (SMITHSONIAN, August 1983).

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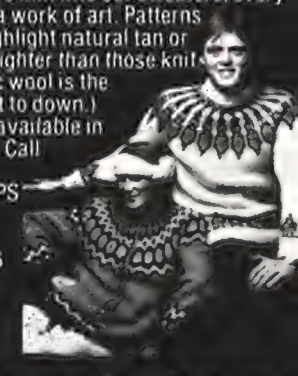

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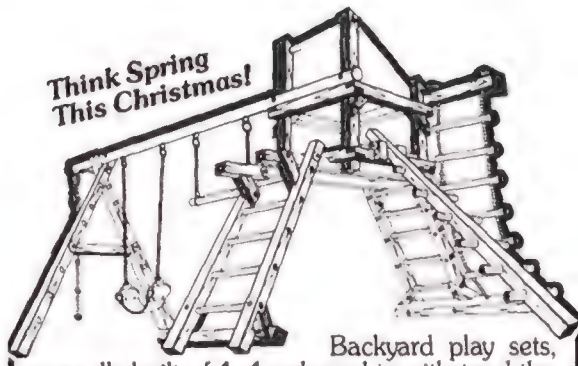

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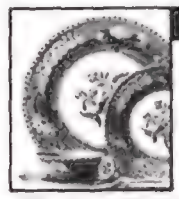

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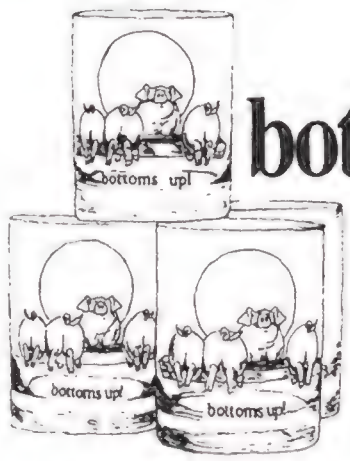

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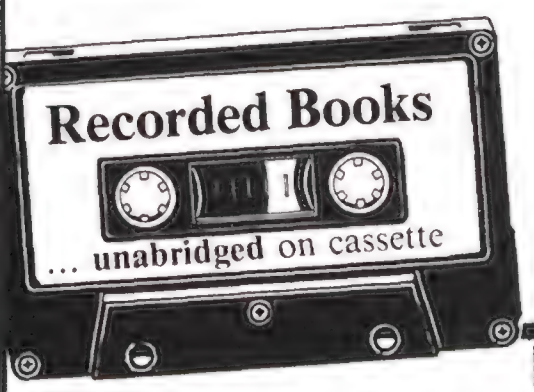

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McPhee loves to track down entrepreneurs and pipe dreamers and watch and listen while they explain away, bringing themselves and their grand schemes to instantaneous, vivid life. He introduces us to several ingenious sets of people who buy up old hydroelectric facilities and set them working, then reap enormous profits thanks to the 1978 federal law requiring territorial utilities to "buy power from private sources." This latter essay is a fascinating lesson in alternative economics and American ingenuity. You finish reading it thankful that these folks don't have the bomb.

McPhee's plain style is enlivened and varied by his gift for seizing on eccentrically memorable details. We learn, for instance, that bears are suckers for Dunkin' Donuts—and, in an amusing deadpan aside, that "in earlier American times, bear oil was highly recommended for the cooking of doughnuts."

McPhee is also an adept coiner of homey, funny images: the doctor's patient exhibits a damaged leg "so full of stitches it looks like a laced boot. The doctor unlaces it." This comes from the best essay in the book, "Heirs of General Practice," McPhee's 100-page report on the phenomenon of Family Medical Practice as he observed it in several doctors' clinics in Maine's "northern countryside." He traces the careers of some dozen young medical people who've forsaken the urban centers, where big money and big reputations are made, to work in small towns, where "people over 70 bring their parents to the doctor" and the need is often for "general talk and counsel."

The agenda of patients and their complaints is fascinatingly detailed, and the investigation is fleshed out by an eloquent overview of the historical changes away from general practice toward specialization, then, essentially since the 1960s, back again toward a humane and idealistic determination to "help people in a deep and personal way" as part of a community. We're made to appreciate what the family-practice physician, overcommitted and without opportunities to truly master specialized disciplines, can do, par excellence: "He can be there when no one else would be." He sounds a little bit like John McPhee.

Bruce Allen
Literary critic

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It is primarily his pieces on writers that mark Theroux as the kind of catholic literary surveyor which the English used to turn out in such profusion. Indeed, the latest of this line, V. S. Pritchett, is one of Theroux's heroes. In his appreciation of the great English critic and short-story writer—still turning out sparkling copy in his 80s—Theroux seizes upon exactly the quality that makes Pritchett such an exhilaration to read, his "gift for the unexpected word or phrase."

There are also homages to Joyce Cary and John Collier, a cogent assessment of Henry Miller's strengths and weaknesses, and a savaging of Hemingway's *Islands in the Stream*. The most valuable of the lot may be the refurbishment of Collier's reputation. He is, Theroux claims, "one of the great literary unclassifiables—it is another synonym for genius." Collier's unclassifiability stems from his having written dozens of wickedly ironic short stories in the mode of Saki and Ambrose Bierce; the screenplay for *The African Queen*; a bizarre novel called *His Monkey Wife*, in which a man marries a chimp; and an unfilmed script of *Paradise Lost* ("an astonishing thing").

The collection also includes a number of travel accounts that did not find their way into the four bookfuls of Theroux's wanderings. The most impressive of these fugitives are not the ones on exotic outposts (Corsica, Afghanistan, Burma) but those set closer to home, that prompt us to see old haunts in new perspectives.

The title essay (*Sunrise with Seamonsters* is a menacing Turner landscape that

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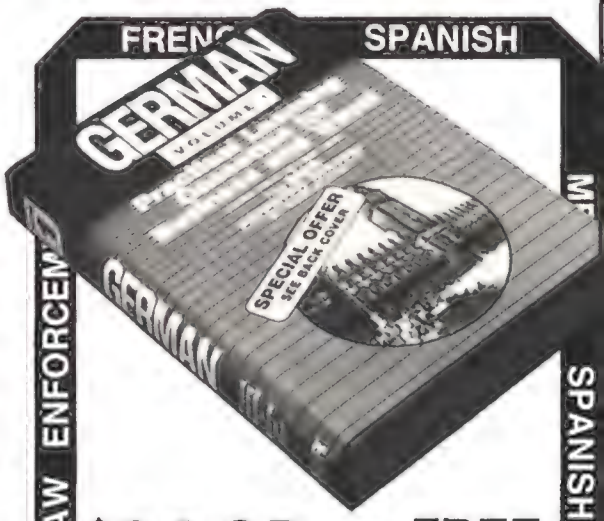

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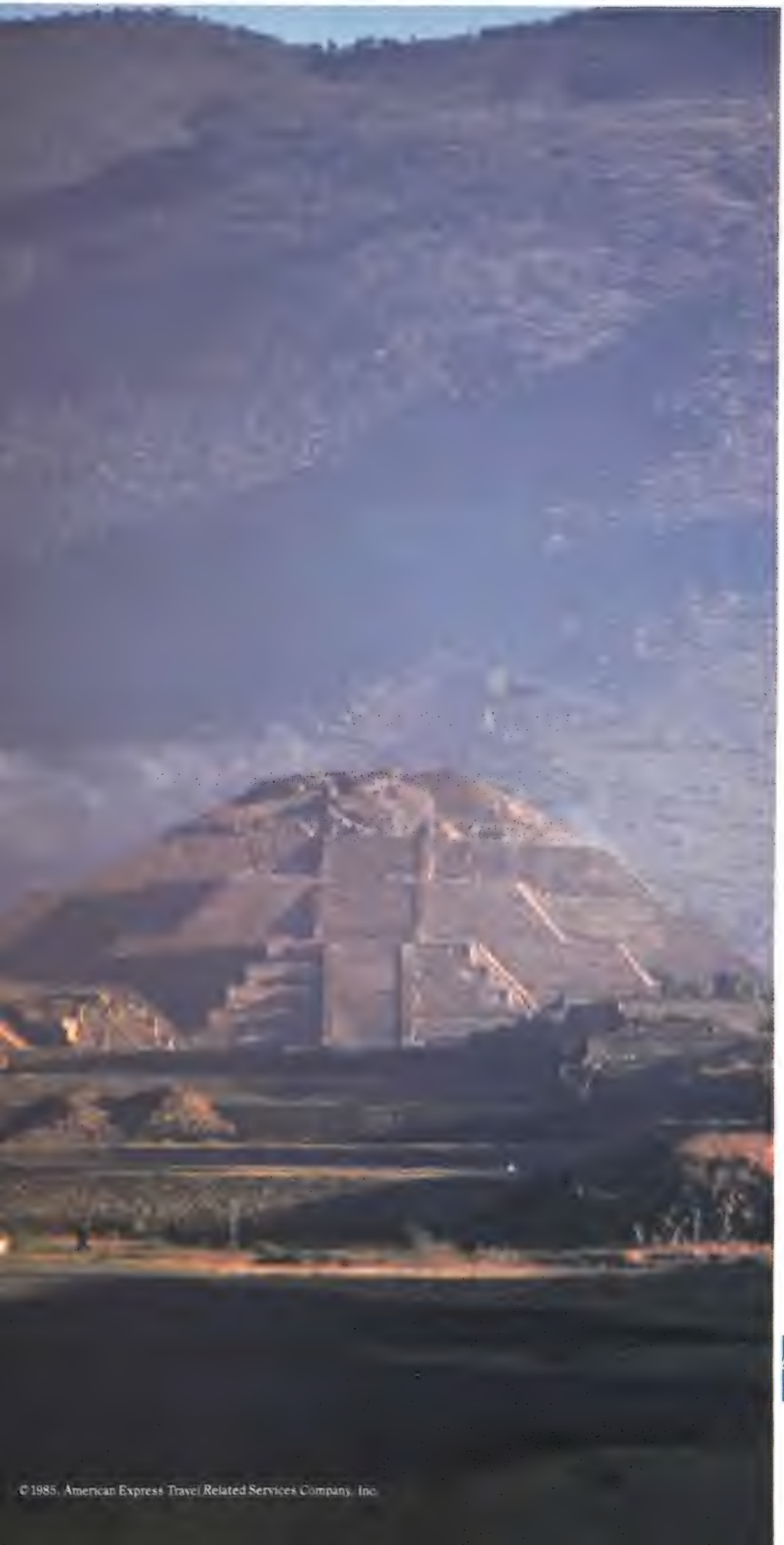

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is reproduced on the book's dust jacket) finds the author in a rowboat harbor-hopping around Cape Cod, where he and his family spend their summers. "Subterranean Gothic," a tour de force in more senses than one, takes him on assignment into the New York City subway system. There he transforms the cynical commonplace that New York is a jungle into a lively pensée. Of course it's a jungle, Theroux agrees, but so are "all very large cities. . . . The jungle aspect of cities . . . is the most interesting thing about them —the way people behave in this jungle, and adapt to it. . . ."

Theroux has a tendency to serve up knobby opinions unsupported by argument, and the book's least successful entries are often the shortest, where room for elaboration is lacking. Consider, for example, "Being A Man," a three-page diatribe against the American ethos of macho maleness. One can agree with every maneuver in the attack while recognizing that it is crudely frontal, with few reserves of reasoning to draw upon.

"The manly attitude towards sports seems to be little more than a recipe for creating bad marriages, social misfits, moral degenerates, sadists, latent rapists and just plain louts," Theroux writes. "I regard high school sports as a drug far worse than marijuana, and it is the reason that the average tennis champion, say, is a pathetic oaf." This insight demands development at length and more to prop it up than a center-court churl or two.

Yet it is easy to accept a literary tartar when his prejudices also lead him to resuscitate the likes of John Collier and illuminate the infernal depths of the IRT. As Theroux's range continues to widen, perhaps his crotchets will ripen into persuasive positions.

Dennis Drabelle
Washington editor and travel writer

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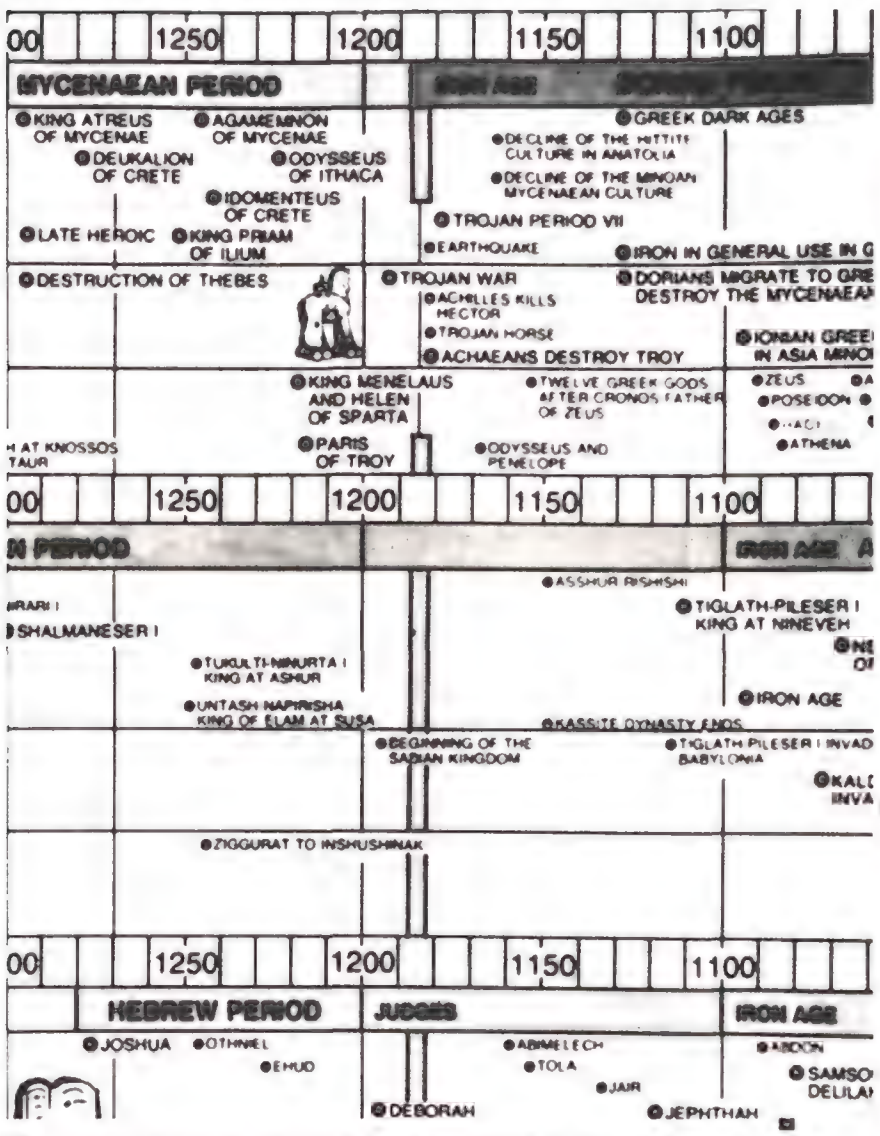

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tastic Hollywood hybrid, one more dashing than Errol Flynn, more congenial than Jimmy Stewart, more virile than Valentino. As author Richard Whelan explains, part of the confusion may be attributed to Capa himself, who throughout his life indulged a habit for exaggeration: "He loved to amuse his friends with embellished tales of his adventures, tales with at least some basis in fact, tales that he told over and over until he himself must have believed them to be true."

Yet Capa's life was remarkable enough without his artful revisions. Born Endre Ernö Friedmann in Budapest in 1913, his parents the owners of a dressmaking salon, he developed a keen appreciation for cleverness and an almost compulsive sense of independence and self-assurance. At 17, expelled from Hungary for political troublemaking, he went to Germany, learned photography, then moved to Paris, which more or less became his home for the rest of his life, although he really lived in a succession of hotel rooms. His lifestyle embraced five passions: women, cards, horses, eating and drinking.

Capa's rise to international fame was

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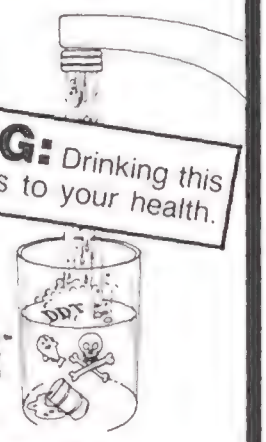

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quick and spectacular. He won his first major assignment at age 19, covering a speech in Copenhagen by the exiled and embittered Leon Trotsky. Although cameras were banned, the quick-witted Capa smuggled one into the hall, stood beneath Trotsky and secretly photographed his fiery, podium-pounding speech.

By the age of 25 Capa was being hailed as the greatest war photographer in the world, having crisscrossed the battlefields of Spain and China to bring back dramatic, often shocking photographs. In World War II he became a sort of living legend through the pages of *Life*. By charm and by cunning, Capa found out where the action was going to be and got there: he parachuted behind German lines, hit Omaha Beach with the troops on D-Day, shot the Battle of the Bulge, entered Paris with Gen. Leclerc's 2nd Armored Division for the liberation. "If your pictures aren't good enough," went his motto, "you're not close enough." He was only 40 when, covering the French Indochina War in 1954, he stepped on a mine and was killed.

There is certainly no lack of rich, colorful material in Whelan's book: Capa's friendships with Hemingway, Saroyan and John Huston; his make-believe career in Hollywood; his affair with Ingrid Bergman; his founding of the great photographic agency Magnum; his bizarre marriage of convenience; his ingenious name change. The documentation here is first-rate, the anecdotes entertaining, the narration tight and well focused. And yet overall the book has a curious lack of style and tension and point of view. Often it seems downright flat and matter-of-fact. The problem, I think, is that Whelan burned himself out trying to separate fact from fiction, particularly in Capa's own memoirs, aptly titled *Slightly Out of Focus.*

An almost haunting companion piece to this biography is *Robert Capa: Photographs,* edited by Whelan and Cornell Capa, Robert's younger brother and an acclaimed photographer in his own right. On page after page the reader will find images of a burning poetic intensity, faces and gestures and dramatic scenes that reveal why Robert Capa, the "great war correspondent and lover," was unrivaled in his field.

Ronald Varney
New York writer

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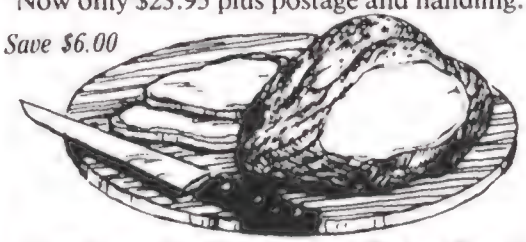

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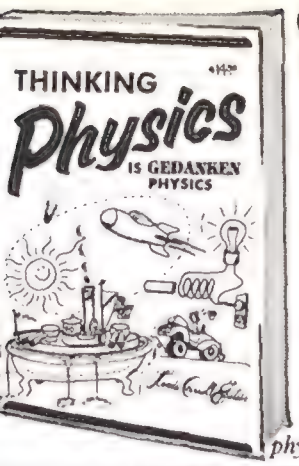

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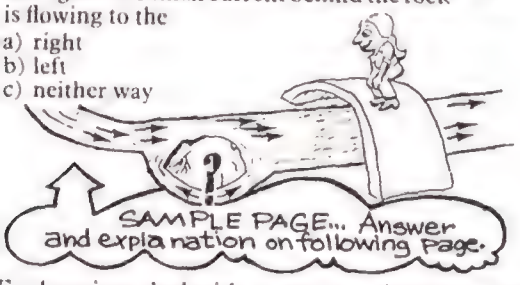

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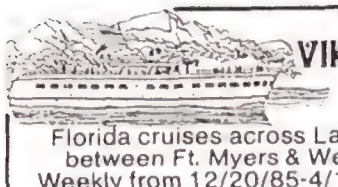

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Smithsonian highlights

For naval buffs, a major exhibition opening at the National Museum of Natural History on November 14 will be a thrill. Telling the story of the U.S. government-sponsored Wilkes expedition (see p. 48), which circumnavigated the globe and surveyed the South Pacific, it will be filled with artifacts that for the most part have not been exhibited since the 19th century. Entitled *The Magnificent Voyagers: The United States Exploring Expedition 1838-1842*, it runs through November 9, 1986.

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The Renaissance: Black Arts of the Twenties (September 15-December 1986) Writers, musicians and artists are celebrated.

National Museum of African Art
History, Context and Materials: Objects from the Permanent Collection (November 12-January 5, 1986).
Go Well, My Child: Photographs by Constance Stuart Larrabee in Collaboration with Alan Paton (November 26-January 5, 1986).
Cry, the Beloved Country (November 30 3 P.M.) Film produced in 1950 by Zoltan Korda and Alan Paton.

National Air & Space Museum
Fire and Ice (through April 1986) Ninety artworks depict comets throughout history (see p. 160).

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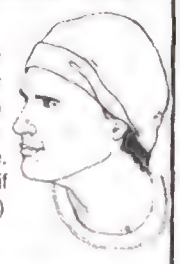

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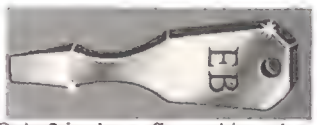

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Sheet music by Aaron Douglas is in Harlem Renaissance show at Anacostia.

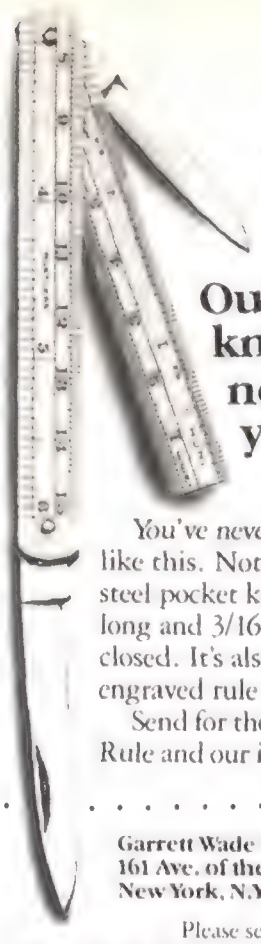
The Science of Comets (November 15; runs indefinitely) How to hunt, find and name a comet; up-to-date news on Halley's comet.
A Pair of Aces (November 7; 7:30 P.M.) Wing Commander Geoffrey Page and Gen. Johannes Steinhoff, two star fighter pilots from World War II.
Finding the Moons of Mars (November 2; 9:30 A.M.) Monthly sky lecture.

National Portrait Gallery
Gaston Lachaise: Portrait Sculpture (November 22-February 16, 1986).
Artists on Paper: Prints, Photographs and Drawings from the National Portrait Gallery Collection (November 22-February 16, 1986).

Freer Gallery of Art
Sixteenth-century Ogama Ceramics from Seto and Mino (November 12; 6:30 P.M.) Lecture by Rupert Faulkner, Victoria & Albert Museum.
Islamic Metalwork (through January 5, 1986) Ten centuries of work represented.

National Museum of American Art
Art, Design and the Modern Corporation: The Collection of Container Corporation of America, A Gift to the National Museum of American Art (through January 19, 1986) See *Highlights continued.*
Focusing on Art: Peter A. Juley & Son (November 22-May 4, 1986) Thirty photographs.

Renwick Gallery
Treasures from the Land: Twelve New Zealand Craftsmen and their Native Materials (November 15-March 9, 1986).



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Hirshhorn Museum & Sculpture Garden
A New Romanticism: 16 Artists from Italy (through January 5, 1986).
Selections from the Collection of Marion and Gustave Ring (through January 12, 1986).

National Museum of Natural History
Living Together (November 8; noon) Film explores question of why animals rarely live alone.
Magnificent Voyagers: The U.S. Exploring Expedition 1838-42 (November 22; noon) Lecture by Herman Viola, curator of exhibition.

Resident Associate events

To become a Resident Associate, or to find out about the many other activities presented monthly, or for fee and ticket information, call 357-3030. Here are some November events:
20th Century Consort Series Opening Concert (November 2; 5:30 P.M.) Music by Stephen Albert, George Crumb, Joseph Schwantner.
Langa and Manghaniyar Folk Singers (November 12; 8 P.M.) From India's Rajasthani region.
Sweet Harmony: Music in Britain's Treasure Houses (November 16; 8 P.M.) New York Chamber Soloists.
A Celebration of Great Jazz Composers, Part I: Jelly Roll Morton (November 17; 7:30 P.M.) Featuring Vince Giordano and the Nighthawks, and James Dapogny.
A Tribute to Louise Brooks (November 19 and 26; 6 P.M.) Screening of two early silent movies directed by Georg Wilhelm Pabst and originally censored.
Pro Musicis Series, Opening Concert (November 24; 7 P.M.) Pianist Lydia Artymiw.

Exhibition catalogs

Catalogs available at this time include:
Anni Albers (paper, $17.50)
Nature's Forms/Nature's Forces: The Art of Alexandre Hogue (paper, $19.95)
After the Revolution (cloth; $24.95)
Hopi Photographers, Hopi Images (paper, $14.95)
Fire & Ice (paper; $14.95)
New Romanticism: 16 Artists from Italy (paper, $9.95)
Magnificent Voyagers, The U.S. Exploring Expedition, 1838-1842 (cloth, $35; paper, $17.50)

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Smithsonian on the air

Radio Smithsonian: features on this weekly half-hour series include a commentary on Halley's comet, a look at crafts of India, and examination of the cultural impact of advertising.
Smithsonian Galaxy: short radio features explore history, science, art.
Here at the Smithsonian . . .: two-minute TV features include highlights from the 1985 Festival of American Folklife and a revolutionary new device to view the universe.

To find out what stations in your area carry these radio and TV programs, write: Office of Telecommunications, MNH Room C222B, Washington, D.C. 20560.

Planning a Smithsonian visit?

The free Associates' Planning Packet will give you a head start. Send a postcard request or phone: Associates' Reception Center, Smithsonian, Washington, D.C. 20560; (202) 357-2700 or TDD for hearing impaired (202) 357-1729. The cordial welcome at the Associates' Reception Desk, 10 A.M. to 4 P.M. daily in the Smithsonian castle, includes special orientation materials in a handy Associates' bag, details on dining in The Court, and discounts in Smithsonian museum shops.

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities outside Washington. To sponsor a show in your community, write: SITES, Smithsonian Institution, Washington, D.C. 20560. Some November exhibits:
Albuquerque (November 16-December 29) *Exploring Microspace*, New Mexico Museum of Natural History.
Boston (November 23-February 2, 1986) *Yesterday's Tomorrows: Past Visions of the American Future*, Boston Museum of Science.
Denver (November 30-February 16, 1986) *Ebla to Damascus: Art and Archaeology in Ancient Syria*, Denver Museum of Natural History.
Huntsville, Alabama (November 17-January 5, 1986) *Edgar Chahine: La Vie Parisienne*, Huntsville Museum of Art.
Kaneohe, Hawaii (November 1-January 31, 1986) *Ban Chiang: Discovery of a Lost Bronze Age*, Hawaii Loa College.
Tallahassee (November 2-December 1) *Black Wings*, Museum of Florida History.
Tucson (November 20-December 29) *Spectacular Vernacular: Traditional Desert Architecture in West Africa and Southwest Asia*, University of Arizona.

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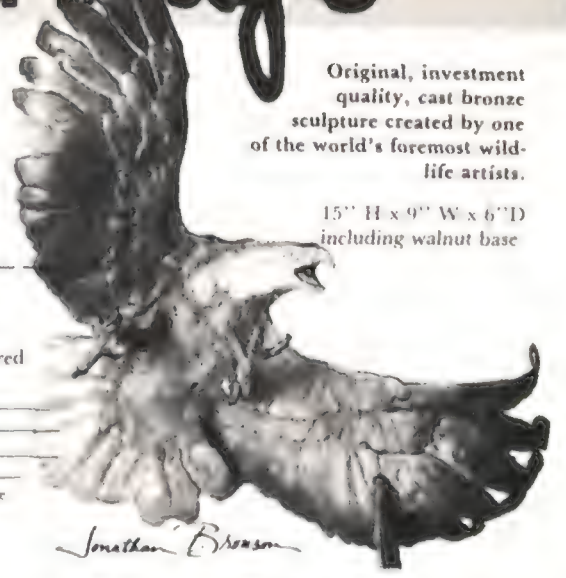

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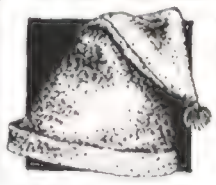

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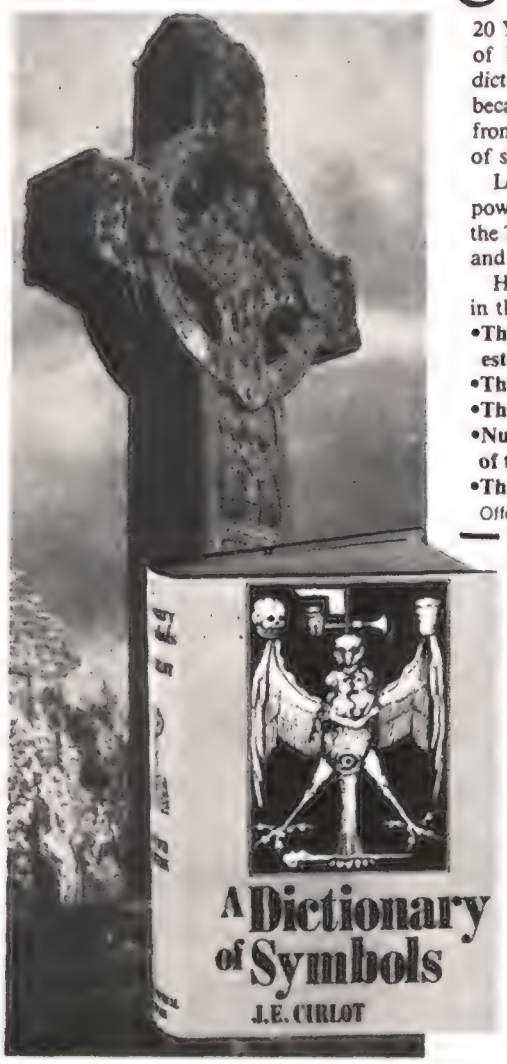

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In 1937, when Paepke's company was 11 years old, he embarked on a new approach to promote it. Inspired by Elizabeth, who collected works by Paul Klee and Le Corbusier, and by his friend László Moholy-Nagy, who had recently arrived there to establish the New Bauhaus, Paepke asked the N.W. Ayer Agency to develop an innovative advertising program for him. Artists would be hired to interpret ideas and concepts, rather than specific products. Eventually, four series were produced; the majority of the works were commissioned for the "Great Ideas" series, which began in 1950 and continued for 32 years. The paintings, drawings, sculptures and collages that resulted—some 350—speak for themselves; seven of them, all from the "Great Ideas" series, are reproduced here.

In every case, the artist was given a quote from a classic work—and freedom to interpret that quote in whatever way he wished. The collection has now been donated to the Smithsonian's National Museum of American Art. Many of the works are currently on view there (through January 19, 1986) in the exhibition entitled "Art, Design and the Modern Corporation: The Collection of Container Corporation of America, A Gift to the National Museum of American Art."

Shortly before he was hired by Paepke to develop this program for him, N.W. Ayer said, "Some people profess to think that Beauty is a 'sissy' and impractical thing, unworthy of the attention of serious businessmen." Paepke and Ayer proved those people wrong, setting a precedent for other corporations to follow.
Constance Bond

John Massey: "The force that through the green fuse drives the flower/Drives my green age; that blasts the roots of trees/Is my destroyer./And I am dumb to tell the crooked rose/My youth is bent by the same wintry fever." *Dylan Thomas*

Anton Refregier: " . . . for I say at the core of democracy, finally, is the religious element. All the religions, old and new, are there."
Walt Whitman

Leonard Baskin: "No man is justified in doing evil on the ground of expediency."
Theodore Roosevelt

Edward McKnight Kauffer: "Nothing is more seductive for man than his freedom of conscience. But nothing is a greater cause of suffering." *Fyodor Dostoevsky*

George Giusti: "Civilization is a method of living, an attitude of equal respect for all men." *Jane Addams*

René Magritte: "Though all the winds of doctrine were let loose to play upon the earth, so truth be in the field, we do ingloriously . . . to misdoubt her strength. Let her and falsehood grapple; who ever knew truth put to the worse in a free and open encounter?" *John Milton*

Richard Lindner: "Two things fill the mind with ever new and increasing admiration and awe, the oftener and the more steadily we reflect on them: the starry heavens above and the moral law within." *Immanuel Kant*

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Yellowstone in Snow February 14-23: A cross-country ski adventure through snow-covered landscapes of Yellowstone and Grand Teton National Parks.

Baja Whale Watch February 21-March 1: Board the *Royal Polaris* in San Diego for an unforgettable trip down Mexico's Baja peninsula to observe the spring migration of gray whales.

Cajun Country March 24-31: Experience Louisiana, from the sounds of New Orleans jazz, aromas of Creole cooking, to mysteries of the bayou.

Okefenokee Swamp April 5-12 or 12-19: Canoe and camp in this uncommon and serene wilderness sanctuary for millions of singing creatures.

Arizona April 16-24 or April 26-May 4: From the Arizona Sonoran Desert to the Chiricahua Mountains, travel throughout the area by van to see cacti in bloom, meet field researchers.

The Hopi and Navajo May 17-27: Visit Grand Canyon, Monument Valley and Canyon de Chelly for an in-depth look at Southwest Indian cultures.

America's Heritage June 28-July 12: Aboard the *Nantucket Clipper* see the July 4th unveiling of the Statue of Liberty. Cruise historic New England and Hudson River ports of call.

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The Atlantic Crossing December 5-20: A sailing adventure from the Canary Islands to Martinique on the four-masted square-rigger *Sea Cloud*. Features lectures on sailing and navigation, marine life and the history of this great ship.

Christmas in Wales December 22-January 3: Based in the ancient cathedral town of St. David's, enjoy walks along the rugged coast while experiencing the colorful holiday traditions of this Celtic culture.

Winter Russia December 26-January 12: Ring in the New Year with a festive holiday gala. Attend the best of Russian theater while visiting historic sites and cities in Moscow, Leningrad and Tallinn.

Backstage London January 2-11: In Europe's theater capital, attend traditional and avant-garde productions, meet company members backstage.

India Wildlife Safari January 31-February 20: Travel by elephant and jeep to observe rare birds and animals in exotic India and southern Nepal.

Thailand and Burma January 31-February 21: Colorful cities, remote villages of the hill-tribe people and historic sites capture the splendor of two of Asia's most scenic countries.

Mexico January-March: Choice of three exciting archaeological tours in the Yucatán peninsula and central Mexico. See extraordinary Maya ruins in the company of an archaeologist.

Borneo and the Spice Islands February 2-22: Aboard the *Illiria*, travel from Southeast Asia to Australia, an area inhabited by more than 350 ethnic groups. Observe the diverse cultures and traditional art; study rich history of the region.

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Blue Whales of Mexico March 9-16: Cruise the Sea of Cortés aboard the *Don José* to explore desert islands and coastlines in search of the mighty blue whales.

Shadows of the Past–Chateaus, Caves and Villages of the Dordogne April 5-19 or April 19-May 3: Explore prehistoric caves, medieval castles and storybook towns; enjoy gastronomic delights in this fascinating region of France. Includes four days of walking tours in Paris.

Istanbul & Beyond May 1-17: Six days in this glorious Turkish city followed by travel to one of three historic areas: Central Anatolia and Cappadocia; the Aegean and Marmara coast or the Mediterranean and Aegean.

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January 5-10 and January 12-17

Join eleven eminent scholars from Great Britain for a seminar on Britain's fabled country homes and see the exhibition "The Treasure Houses of Great Britain" at the National Gallery of Art during a week that will feature richly illustrated lectures, special gallery tours and gala evening events.

This dazzling exhibition, presented under the patronage of Their Royal Highnesses The Prince and Princess of Wales, will bring together more than 700 works of art, including paintings by Rubens, Velázquez and Turner; sculptures by Praxiteles and Bernini; furniture and decorative arts that represent a tradition of art collecting and private patronage on a grand scale from the 15th century to the present.

The lecture program will provide insights into the cultural and political forces that gave rise to hundreds of splendid country houses. Small group sessions will highlight superb collections of paintings, porcelain, silver, costumes and textiles, jewelry and furniture.

Associates will learn about the challenges of restoring and preserving country homes and the objects they contain; explore the colorful history of heraldry; enjoy the genteel rituals of tea drinking, and gain a firsthand view of two of Britain's most famed country homes as their present owners describe contemporary life in Scone Palace and Firle Place.

To enhance your course of study, you are invited to attend a gala welcoming dinner, where you will meet fellow Associates and your distinguished British faculty; hear 18th century music originally commissioned for country homeowners and performed by the Smithson String Quartet, and enjoy a "high tea" in the sumptuous surroundings of the Grand Salon of the Smithsonian's Renwick Gallery.

or (202) 357-1350 for seminar brochures.

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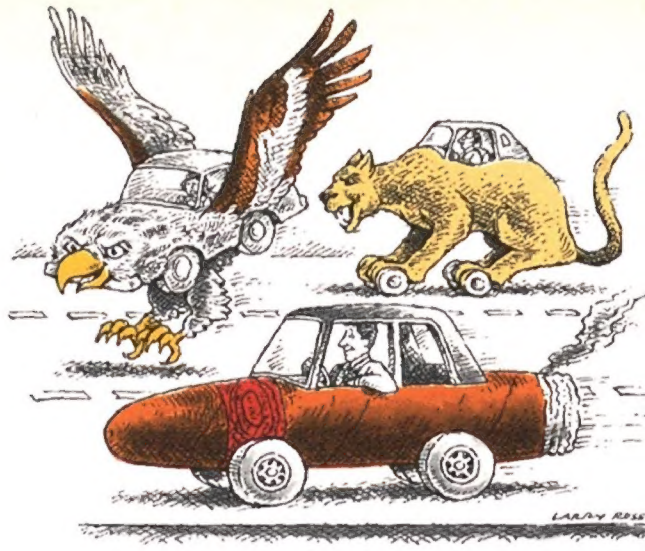
By Donald Dale Jackson

So why not *a Dodge Caucus or VW Crumpet?*



I was having a good time cruising around in my new Nissan Sentra until somebody asked me what a Sentra is.

I looked it up in the dictionary but found nothing between "sentinel crab" and "sentry." I asked my friends, even asked the dealer who sold it to me. He didn't know either. "Why worry about it?" he shrugged.

I tried to follow his advice. But when I took to the interstate in my mysterious car the automotive identity crisis began to work on me. A Tercel buzzed by and then a Jetta. I saw a Camry, two Coronas, a Celica and a Cressida. I didn't have the faintest idea what any of those words meant. They didn't even *evoke* anything—summoned no visions, conjured up no moods. The names chrome-stitched onto the trunks of these cars struck me as little more than random collections of letters. Or as Linotype operators might put it, *etaoin shrdlu.*

A little research made me realize I'd been a bit too hasty. A Tercel turned out to be a male hawk or falcon. Cressida is a character in a bitter comedy of Shakespeare's and a poem by Chaucer, a highly fickle female both times out. A Corona is a cigar. So OK, some of the words *weren't* exactly meaningless, but why name cars after them? And what, if anything, was the pattern? All three are Toyotas, of course. Are their Japanese makers aware of these elusive meanings? Smoking up the highway like a cigar? Sought after like Cressida—a lady who most certainly had a classy chassis? Probably not. So what's going on? What do they call these cars in Japan? Who knows from Tercels and Cressidas on the Ginza?

Car names used to be beguilingly straightforward. There wasn't much subtlety about all those Mustangs and Wildcats and Jaguars and Impalas and Cougars. Neither was it difficult to divine what the manufacturers wanted us to think about the cars that sounded like racetracks or resorts: Le Mans and Monte Carlo, Continental and Riviera. Speed and power. Diamonds and velvet. The clink of chips and silken boulevards beside an azure sea. Please pass the pâté.

The name twanged a responsive chord in the potential buyer. I remember being deeply drawn to a car called Maverick. They had *me* pegged, all right; I liked to see myself as a maverick; it matched the self-delusion I was carting around at the time. The first car I ever owned, when I was 16, was a Nash Rambler. And when I was behind the wheel I rambled—or at least I ardently believed I did and wanted everyone else to think so—especially the girls whose houses I rambled past nine or ten times a day.

But how is a Sentra owner supposed to *feel* about himself? I can grasp the passions that stir the driver of a Bronco or El Dorado, emotions still summoned up regularly on TV, especially those mud-drenched, rock-bound, axle-breaking mini-epics that purvey trucks and four-wheel-drive macho-mobiles ("Dodge trucks are RAM tough"). But what urges propel Cressida and Omni owners? Or drivers of Preludes and Accords?

Preludes could be leading up to something. But what? Accords could suggest you ought to be driving in Geneva, with Shevardnadze and Schultz in the back seat. But both actually represent another baffling new breed of nomenclature—automotive monikers that mean something else, something understood by most people but when applied to cars have mysterious connotations irrelevant to driving, or to drivers' fantasies. Honda specializes in such names—Accord, Civic, Prelude. But Nissan is right up there with Stanza. How can a car be an accord or a stanza? They are mixed metaphors on wheels. If a car can be named Civic it can be named anything. Dodge Caucus. Toyota Blanket. Saab Particle. Audi Dismay. Volvo Umbrella. Cadillac Insight. Plymouth Matrix. Volkswagen Crumpet. The possibilities stretch off to the horizon like a Kansas highway.

It may well take a PhD candidate to explore the nuances of car names in detail: one imagines a monograph entitled *Fleeting Images: Sound and Meaning in Automotive Appellation.* But I carried my quest for short-term enlightenment to some automobile admen. One reminded me that today's automakers have to think internationally; often model names are an attempt to strike a kind of transcultural golden mean—a sort of commercial Esperanto. Sometimes this backfires. The popular, and properly international, Chevrolet Nova proved an embarrassing dud in South America, where the literal Spanish meaning of No-va is "No go."

Another big idea is to let advertising *create* the image rather than limit it to a word (Mustang, Riviera) with a fixed symbolism already built in. So much for wild steeds and turquoise waters. We're into neutral names, amplified by sales pitches from film stars seductively running on about futurism and crushed velour.

My own unverified curbside theory is that the marketing folks fed data into their computers—the percentage of new cars bought by women, what age groups favored certain kinds of cars—and collated it with various sounds. The computers concluded that soft, nonthreatening syllables, nonsensical or not, were the way to go. Ramblers and Mavericks lacked the saleable sound of today. Too specific and too harsh. We have, I suspect, all been demographically and electronically manipulated.

But the fact is they've still got me pegged. My rambling days are gone. These days I'm a quiet, peaceable—Sentra

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